Aalto University
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# CONTROLLING THE SWEET DRINK

## An evaluation of policies to reduce overconsumption of sugar-sweetened beverages

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**Abstract**

In the wake of the recent obesity epidemic, policymakers are grappling with ways to reduce calorie consumption. One of the biggest culprits of high-calorie intake is Sugar-Sweetened Beverages (SSBs). SSBs cost the society in two ways: directly through healthcare costs of diseases caused by SSBs such as metabolic syndrome and Type 2 Diabetes; and indirectly through a reduction in productivity levels due to absenteeism caused by these diseases. At present, the price of SSBs does not reflect this cost on society and thus the consumption of SSBs is at a socially nonoptimal level. This paper evaluates the economic (own-price, cross-price and income elasticity) and non-economic factors (socioeconomic, psychological and cultural) that influence SSB consumption and the current policies in place to reduce SSB consumption. Finally, it proposes a novel study to quantitatively compare two common taxation policies to reduce SSB consumption: sugar tax and SSB tax.

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# 1. Introduction

## 1.1 Background

A writer once summarized that the role of the government in managing the marketplace with companies is similar to that of the referee in setting up the rules for a sports game and ensuring that the teams play fairly (Brodwin, 2012). As citizens, we want to ensure that companies follow certain principles and do not cause harm. Thus, the government must involve itself when the marketplace is hurting the consumers. It is estimated that in the United States, 3 out of 10 people consume a product at least once per day that leads to diabetes, obesity, hypertension and dental caries (Lundeen, 2018). The harmful product in question is an SSB.

## 1.2 Definition of SSB products and their dangers

Sugar-Sweetened Beverages (SSBs) are beverages with added sugars (mono-, di- or polysaccharides). SSBs normally refers to non-alcoholic beverages and comprise of a wide range of products, from carbonated soft drinks (sodas), fruit juices and flavoured water to energy drinks. Sodas (also referred to as “fizz”, “pop”) such as Coca-Cola, Fanta, Sprite, Pepsi when containing sugar are thus one type of SSBs. However, diet versions of Sodas (“Coke Zero”, “Pepsi Max”) would not be considered as SSBs. This thesis focuses on all types of SSBs including Sodas.

SSBs are often said to contain “hidden” sugars since the amount of sugar in an SSB is not always reflected in its taste. Consider the following image showing the amount of sugar per drink.


*Figure 1 There is a vast variety of SSBs. This figure shows the amount of sugar in various SSBs (Thai Medical news, 2019)*

SSBs are triply harmful since they have a lot of calories, low nutritional value and they do not cause satiation (fullness) in the same way as eating foods with similar amounts of calories. It is therefore easy to consume a large number of calories over a short period (Bonilla-Chacin *et al.*, 2016). According to a survey conducted on Australians, almost half of the respondents exceeded free sugar intake recommendations. The largest source of free sugar were SSBs and young adults were the highest consumers (Gupta *et al.*, 2018). As with other products, SSBs are growing with increasing popularity amongst low, and lower-middle-income countries as these are being targeted by the food industry due to them being on course to be very profitable markets (Soares, 2016).

SSBs are linked to diabetes and obesity due to their high sugar content and the ease with which they provide the body with large amounts of calories (Saxena *et al.*, 2019). A positive correlation between intake of SSBs and weight gain has been observed in both children and adults. Thus SSBs are seen as the cause of the rising obesity epidemic (Malik *et al.*, 2006). Drinking large amounts of SSBs is also linked with the development of metabolic syndrome and Type 2 Diabetes (Malik *et al.*, 2010). To put a number on the cases caused by SSBs, consider the following image displaying the cases that would be caused due to consumption of SSBs.

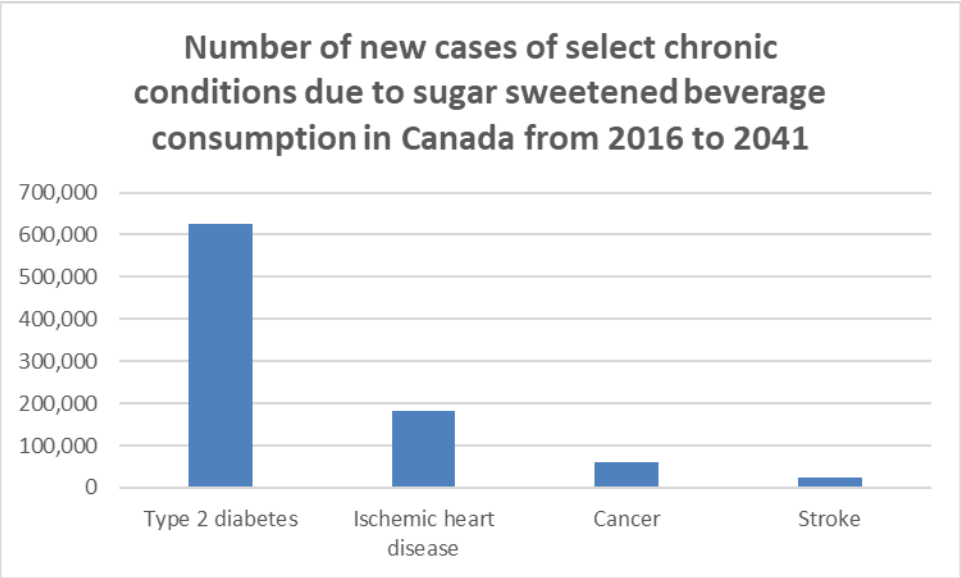



*Figure 2 Projected cases of certain conditions due to the consumption of SSBs in Canada from 2016-2041 (Jones* et al.*, 2017)*

There are hundreds of thousands of cases of Type 2 diabetes, Ischemic heart disease, cancer and stroke that will occur merely due to excessive consumption of SSBs. The sickness caused by sugary drinks is costly for the individual and society at large. For example, obesity does not only lead to healthcare costs for the individual and society, but it also impacts the economy of a country. Obesity leads to absenteeism, disability pension and reduced ability to work (Tremmel *et al.*, 2017). Thus, SSBs not only affect the individual who consumes them (private cost) but also cost society (social cost).

### 1.3 Research Questions and Objective

Considering that SSBs are associated with higher mortality (Malik *et al.*, 2019), they can be compared to alcohol and tobacco whose consumptions are now widely regulated. Thus, government intervention is important to regulate the consumption of SSBs.

This paper aims to determine a method to identify the best policy for reducing SSB consumption by grappling the following research questions:

1. What are the determinants of SSBs consumption?
2. What tax and other policies could be applied to reduce the consumption of SSBs?
3. What would be a good method to empirically investigate the impact of tax policies on the consumption of the SSBs?

This research is targeted towards policymakers and researchers within health economics. The results and methodology presented will also be useful for beverage manufacturers and retailers to determine the impact of policy changes on the consumption of SSBs. Due to time restrictions, this study is limited to a presentation of the current situation including analysis of the factors that influence SSB consumption and evaluation of current policies to reduce consumption of SSBs, based on which a study methodology is presented to quantitatively evaluate the impact of the current methods to reduce consumption of SSBs.

Chapter 2 presents the literature review introducing the factors that impact the consumption of SSBs, discussing policies to regulate the consumption of SSBs and the impact on citizens. Considering the factors that are involved in the consumption of SSBs, Chapter 3 presents the study to objectively evaluate the impact of two current methods of taxation. Chapter 4 analyses the proposed study and addresses its implications. Chapter 5 presents the conclusion.

## 2. LITERATURE REVIEW

### 2.1 Methodology for obtaining the relevant literature

Key search terms and relevant databases were identified. Possible synonyms of key terms were identified. Databases were searched using the following query:

(“Sugar tax” OR “Soda Tax” OR “SSB tax”) AND (“Beverage consumption” OR” Drink consumption”).

“Soda tax” was used as a search-term in case there were countries that had applied tax on only sodas (carbonated drinks with sugar) and not other SSBs. The search was restricted to articles published between 1900-2020 to focus only on recent research. Newspaper articles, blogs, podcasts and websites and articles not in English were excluded. Only full text, peer-reviewed articles were included. Articles were obtained from the following databases: World bank, EBSCO, JSTOR and ABI Inform/ProQuest; as well as from the advisor of this thesis.

Articles were initially filtered for relevance by title and abstract and then full-text reading of the potentially relevant articles. In total, 33 articles were identified as being relevant. Studies were either i) primary studies observing results from implemented taxation

policies or ii) testing the effects of taxation using virtual or real markets (changing prices at a specific store) or iii) model studies trying to forecast the potential impact of different taxation methods.

## 2.2 Factors affecting the excessive consumption of SSB

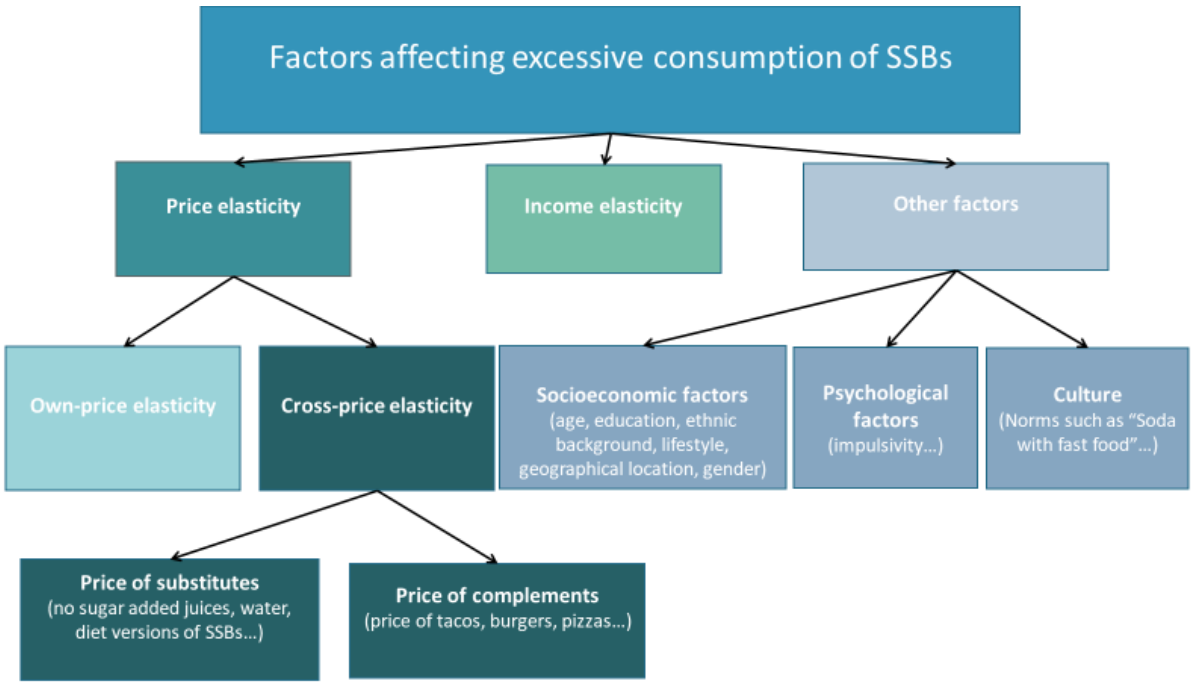



*Figure 3 Factors affecting excessive consumption of SSBs*

### 2.2.1 Price and income effects of demand for SSBs

Based on neoclassical economic theory, the main factors that affect demand are the price of the good, price of the substitute goods and income of the consumer. The subsequent parts of this section will review the price and income effects using the concept of price and income elasticities that measure the proportional change in the quantity of the good demanded due to the percentage change in one of the determining variables such as the own price, consumer income and the price of substitutes.

*Own price elasticity of SSB goods*

According to economic theory, the demand for SSB goods will depend on their own-price. If the SSB good is assumed a *normal good*, an increase in the price of that good, will decrease the demand for it; while when the price decreases, demand will increase. Moreover, if the demand for the SSB good is *price elastic*, the demand for that good will be easily affected by the price change. For example, an increase in the price of the SSB good by 1 per cent will decrease the demand for that good by more than 1 per

cent. The demand for *inelastic goods*, on the other hand, is not as easily affected by the price of the good.

The price elasticity of demand depends on several factors. First, it depends on the perceived necessity of the good. In the case of SSB, if it is determined that it constitutes an important part of the diet, no matter the increase in price, the decrease in demand will not be substantial.

For example in Mexico, there is a tradition that when one is eating tacos, one drinks soda with it as part of the meal (Soares, 2016). If culturally they are considered well-paired, it is understandable that soda would almost be considered a necessity and no other beverage would replace sodas. Thus, if people can afford to, they would choose to buy sodas when having tacos.


*Figure 4 Tacos and Coca-cola (Habanero Grill and Cantina, 2018)*

Similarly, in Western countries, fast food companies, such as McDonald's package SSBs (sodas or juices) as part of the meal. However, the trend is slowly changing, and McDonald's Finland is now also offering milk as a drink alternative for the Happy Meal.


*Figure 5 Happy Meal Options from McDonald's Finland. Note the drink alternatives: juices and milk (bottom right image) (McDonald's, n.d.)*

Second, the price elasticity will depend on available substitutes. In the case of SSB, this would mean that demand for SSB would only decrease if there are products that can fulfil the need that SSBs provide. Meanwhile, if the substitutes are deemed not good enough, demand would not decrease for the SSBs. For example, if the quality of water is determined as not safe enough to drink, SSBs would be preferred (Soares, 2016).

Third, it depends on how much the product costs as a percentage of the consumers' total income. If the cost of SSB is deemed to not require a large proportion of the income, then the increase in price, would not have as large an impact on the decrease in consumption (Welch and Welch, 2013).

The aim of taxing a product to deter its consumption is by increasing the price of the good. Thus, for SSB taxation which aims to reduce consumption of SSBs to be effective, it is important that the demand of a good is elastic and thus the increase in the price of sugar-sweetened beverages leads to the decreased consumption of SSB goods.

Studies have shown that SSBs are price-elastic and have a mean price elasticity of about -1. This means that a 1% increase in price, leads to a 1% decrease in consumption (Thow *et al.*, 2018). This would imply that the demand for the SSBs would

be unit-elastic concerning income, and hence, they would be considered as normal goods. So, while SSBs may be considered culturally important and as complements for other products (as explained in the tacos example above), it seems that in most cases, taxation would still be successful in reducing consumption of SSBs. A successful decrease in consumption of SSBs has been observed in Berkeley, California where the implementation of a $0.01/oz of sugar in SSB tax led to the decrease in consumption of SSBs by 21% in a time when consumption increased 4% in comparison cities (Falbe *et al.*, 2016). The results also seem to hold over time. In Mexico, the one-peso-per-litre tax led to an average 8.2% decrease in the purchase of taxed beverages over two years (Colchero *et al.*, 2017).

*Income elasticity of SSB goods*

Another way to classify goods is by studying the changes in the income of the consumer and the perceived demand for the product. *Normal goods* are goods whose demand increases as consumers' income increases. On the other hand, the demand for *inferior goods* decreases as consumers' income increases (Welch and Welch, 2013).

If SSBs, for example, are considered as an essential part of the diet, possibly due to marketing and creating a cultural belief that it is a part of a meal such as the belief that tacos should always be accompanied by sodas (Soares, 2016), the demand for SSB would increase as consumers' income increases and they can afford to have it more meals. In this case, it would be a *Normal good*. To see the effect of marketing on cultural beliefs consider the following advertisement by Coca-Cola for the Islamic festival of Eid. The advertisement (Coca-Cola, n.d.) is clearly showing that Coca-Cola belongs on the dinner table of such a good occasion and that if consumers can afford to, they should have as much Coca-cola on their table as a sign of prosperity.


*Figure 6 Advertisement by Coca-Cola for Eid*

Another hypothesis could be that consumers perceive SSBs as “unhealthy” and thus demand for SSBs would decrease as income of consumers increases and they can afford “healthier alternatives”. For example, as people get wealthier, they may choose to make their juices which are costlier in terms of time and equipment needed to manufacture but have lower amounts of added sugar compared to store-bought alternative since they can control the amount of added sugar. In this case, SSBs would be considered an *inferior good*. It is important to study how consumption of SSBs vary for consumers from different income levels since no group must be unfairly affected by the SSB tax.

*Price of substitutes*

*Substitutes* are products that can replace a product as they fulfil the same need as the product in question. For example, in the case of SSBs, one can choose to drink water, natural unsweetened juices or then diet versions of sodas which would not contain sugar. There is evidence that in certain countries substitution effect for SSBs would be smaller. For example, in India, it was observed that during certain occasions, soft drinks were drunk as distinct drinks (not substitutes) (Kumar and Ray, 2018). This can partially be influenced by marketing such as the previous example of Coca-Cola displaying itself as a distinct drink to be drunk during festivals such as Eid. The amount of consumption, however, depended on how close the point of purchase of soft drinks

was located and in general diet drinks and fruit juices were more commonly consumed. Thus, in most cases, SSBs substitutes were consumed, however for certain specific occasions SSBs were preferred and there was no clear substitute for them at those events.

The pricing and availability of substitutes can impact the demand for a product. For example, in some parts of Mexico, lack of safe drinking water creates a demand for SSBs (Soares, 2016). Further, if safe bottled water is more expensive than SSBs, then there would be a higher demand for SSBs.

Taxation aims to make SSBs more expensive, consequently making substitutes for SSBs more attractive thereby inducing consumers to switch to healthier substitutes. In practice, taxation of SSBs to encourage consumers to switch to healthier alternatives has been quite successful. For example, water consumption increased by 63% in Berkeley after implementation of SSB tax compared to 19% in comparison cities (Falbe *et al.*, 2016). Meanwhile, in Mexico, purchases of non-SSB beverages increased by 2.1% after implementation of the tax (Colchero *et al.*, 2017). However, it is important to consider that correlation does not imply causation and does not take into account marketing by manufacturers or government schemes to increase consumption of non-SSBs.

In Mexico, two studies that have looked at the cross-price elasticity of demand for SSBs, have shown that water is a substitute for SSBs. The cross-price elasticity of demand of SSBs is significantly positive among the richest 20 per cent of the population (Bonilla-Chacin *et al.*, 2016). This means that they would be even more likely to switch to water in case of an increase in the price of SSBs. On the other hand, when the price of water increases, the quantity consumed of sodas increases for households at the two extremes of the income distribution (quintiles 1 and 5). Meanwhile, among the poorest 20 per cent of the population, milk is a substitute product for SSBs. Thus, when the price of milk increases, the quantity consumed of sodas increases significantly for quintiles 2 and 5 (Bonilla-Chacin *et al.*, 2016).

Considering the relationship between the demand for sodas and the price of substitutes, it is crucial that not only should the price of SSB be increased to reduce

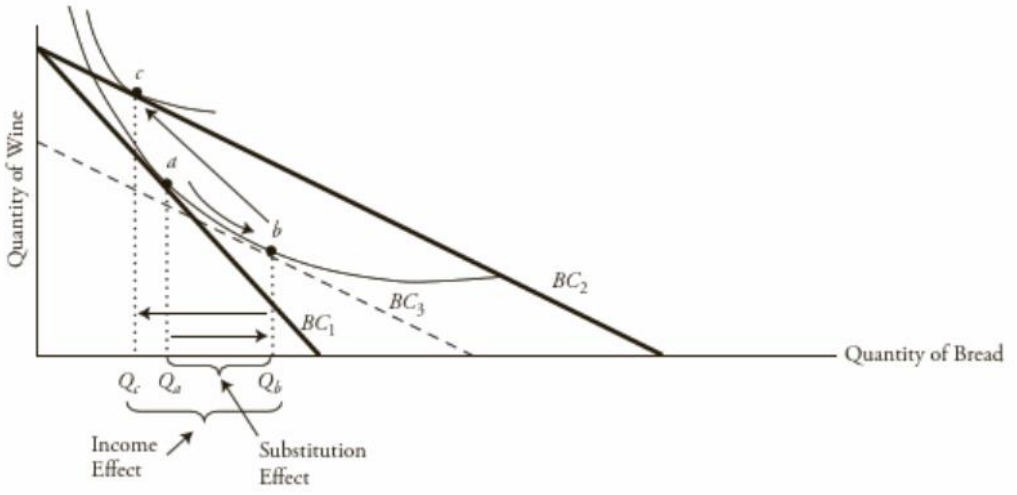
consumption of SSB, but it also important that the price for the substitute products is comparatively lower. Based on the results, the increase in the price of SSB due to taxation must be greater than any increase in the price of water or milk.

*Giffen Goods*

Giffen goods are goods whose demand increases as price increases. This is due to a combination of two effects: when the income effect is greater than the effect of substitution. For inferior goods, as income increases, the demand for the product decreases. Meanwhile, the substitution effect means that demand for a product decreases as its price increases. However, in cases where no substitutes are deemed good enough, as the price of a product increases, purchasing the product reduces the available income and the income effect takes hold – where the lower the income, the higher the quantity demanded of the good. Thus, the observed effect is that demand increases as price increases. This effect was seen for potatoes during the Irish famine, as potatoes were considered such a vital staple (Piros and Pinto (eds.), 2013).

If SSBs were Giffen goods, it would imply that increasing the price of SSBs through taxation, would, increase their demand. However, as previous observational studies have shown that SSBs show a strong substitution effect and that in all cases of SSB taxation, the demand for SSBs has decreased, it can be deduced that SSBs are not Giffen goods.

EXHIBIT 2-18 Income and Substitution Effects for a Giffen Good




*Note:* Income and substitution effects of a fall in price for a Giffen good: When price declines, the consumer chooses to buy less of the good.

*Figure 7 Graph showing income and substitution effects for a Giffen Good (Piros and Pinto (eds.), 2013, p.83)*

### 2.2.2 Other factors

Impact on the consumption of SSBs could also be caused by other factors. First, there are *socioeconomic factors*: In a study looking at SSB consumption in families, a link was seen between younger age of parents and lower education in adults and consumption of SSBs (Elfhag *et al.*, 2007). However, the results are not conclusive. Among Nordic adolescents studied during the years 2001/2002-2009/2010, there was no significant association between soft drink consumption and socio-economic status apart from the survey conducted in Denmark during the year 2009/2010 (Fismen *et al.*, 2016). In the United States, the *odds for consuming SSBs 1 or more times per day* were linked to *age* (younger respondents had higher odds of drinking SSBs) *gender* (men had higher likelihoods), *ethnic background* (Hispanic and non-Hispanic black respondents had higher odds), *lifestyle factors* (current smokers, obese and those with no physical activity had higher chances), *geographical location* (respondents residing in nonmetropolitan counties had higher odds), *employment status* (employed respondents had higher probabilities) and *education* (respondents with less than high school education had higher odds) (Lundeen, 2018). This implies that certain groups are more vulnerable to excessive consumption of SSBs. These groups should be

identified for more targeted information campaigns to motivate for reduced consumption of SSBs.

Secondly, there are *psychological factors*. For example, increased SSB consumption is linked to those who are less likely to restrict intake of calories and those who are more sensitive to the external stimuli of food (Elfhag *et al.*, 2007). Finally, there is a *cultural influence* on the intake of SSBs which is heightened by marketing such as the case with "soda and tacos" and the situation in India where SSBs were consumed for specific occasions (Kumar and Ray, 2018; Soares, 2016).

### 2.3. Overview of policies to reduce consumption of SSB

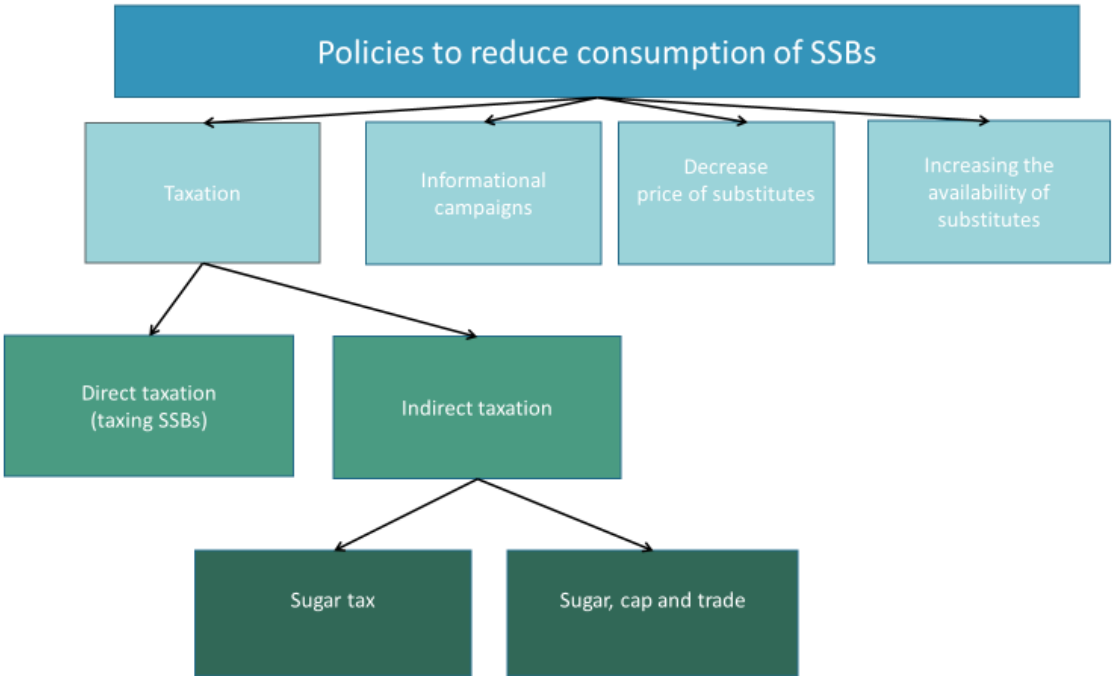



*Figure 8 Policies to reduce excessive consumption of SSBs*

#### 2.3.1 Taxation

*The role of taxation*

Taxes are an important measure to deter us from things: high-income taxation can cause people to relocate to other countries and high taxation on certain items, can reduce our consumption of them. Taxation is, therefore, a measure used to guide our behaviour. Taxation on unhealthy behaviour, colloquially also known as "sin taxation" has been successful in reducing consumption of alcohol and tobacco. In the wake of the obesity epidemic, several countries are now implementing taxation on sugar-

sweetened drinks (SSBs). This thesis focuses on taxation as a deterrent of harmful behaviour rather than as a source of revenue for the government based on the taxation methods proposed by Pigou (Kaplow, 2008).

*Pigouvian taxes*

In economics, an *externality* refers to the effect of an action on people or objects not involved in the original transaction. A negative externality specifically refers to the cost borne by the people or objects who were not involved in the original transaction. Normally the price of a product is determined by the marginal cost of a product and the marginal benefit derived from a product. However, this does not account for the external costs of the product and thus the price of the product is not reflecting the 'actual cost' of the product. Examples of negative externality include pollution and tobacco.

One can draw similar parallels for SSBs. SSBs not only impact the person who consumes them, but society also must bear a cost as a result of private consumption of SSBs, in the form of healthcare costs and reduced productivity. SSBs are a contributing factor to obesity which in turn can lead to absenteeism and reduced ability to work (Tremmel *et al.*, 2017). Thus, the price of SSBs should not only include the actual cost of manufacturing SSBs but also the indirect costs of SSBs. This would lead to demand for SSBs changing to a level which is more reflective of the costs and benefits of SSBs.

*Pigouvian taxes* are taxes on products with a negative externality. The purpose is to raise the cost of the product to reflect its actual cost, by accounting for the cost caused by the negative externality. Thus, the government intervenes to adjust for the externality (Parkin *et al.*, 2005). It is recommended that the tax revenue obtained from Pigouvian tax then be used to combat the negative externality caused by the product.

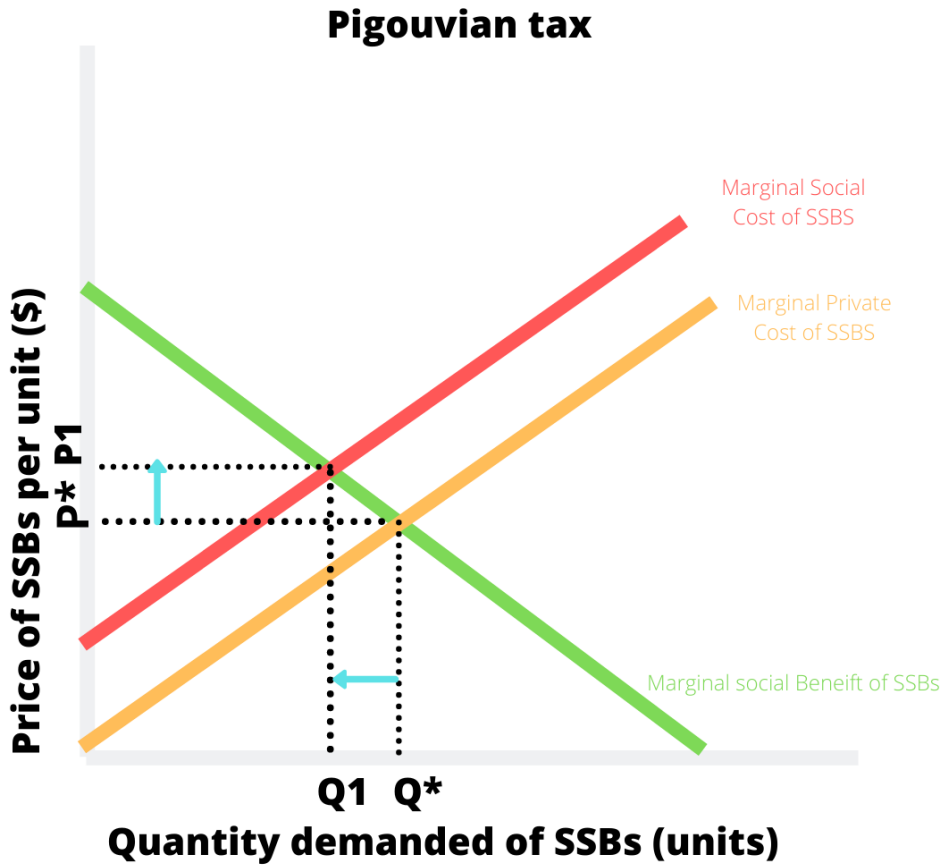



*Figure 9 Graph showing the effects of a Pigouvian tax on SSB consumption (indicated by the blue arrows). Author's illustration based on an illustration of Pigouvian tax (Parkin et al., 2005).*

The orange line shows the Marginal Costs of SSBs. As one consumes more SSBs, the cost for the individual increases, for example, due to healthcare costs. Similarly, the costs of SSBs for society increase as more individual's consumer more SSBs. Societal costs are higher because society not only has to bear the cost of healthcare but also costs such as decreased productivity leading to decreased economic output. To balance this, governments can raise the prices of SSBs with the help of taxes (blue arrows, P* => P1) so that a new price equilibrium is reached where the marginal social benefit of SSBs (green line) is equal to the marginal social costs of SSBs. At this new level, the quantity of SSBs demanded (Q1) is lower than without the tax (Q*).

Based on an OECD report (OECD, 2019), there is a trend in most countries to decrease the consumption of harmful products such as tobacco and SSBs by implementing taxes. The following table lists the tax against SSBs in certain OECD and OECD partner countries. Other countries which have implemented a tax on SSB

include Mexico and certain cities in the United States (Colchero *et al.*, 2017; Falbe *et al.*, 2016).

*Table 1 Taxation policies reforms in 2019 against SSBs in some OECD and partner countries (OECD, 2019)*

| | |
|---|---|
| South Africa | For beverages with more than 4 grams of sugar per 100 ml. A tax of 2.21 cents per gram for every gram of sugar exceeding the first 4 grams. The amount has increased from 2.1 ZAR due to inflation |
| Ireland | The base of the sugar-sweetened drinks tax has increased.<br>The definition of "sugar-sweetened drink" has changed to subject certain categories of beverages to the tax when they do not contain at least 119 mg per 100 ml of calcium. |
| Finland | Increase in the tax rate on soft drinks |
| Portugal | the lower bracket of the tax on sugary beverages (up to 80 g of sugar per litre) was divided in three, with tax rates depending on sugar content. For beverages containing more than 80 g of sugar per litre, an increase in the tax from EUR 16.69 to EUR 20 per hl. |
| Hungary | 20% increase in public health tax (or "snack tax") |
| Norway | Reduction in tax on chocolate and sugary products |

The tax in most countries is specifically set to counteract the diseases caused by SSBs. In Mexico for example, the tax on SSB and foods with low nutritional content was set to combat diabetes and obesity (Bonilla-Chacin *et al.*, 2016). Studies have predicted staggering effects of a tax on reducing healthcare and illnesses. For example, it is estimated that in the Philippines, an SSB tax would prevent thousands of deaths due to diabetes and stroke and tens of thousands of deaths from ischemic heart disease over 20 years (Saxena *et al.*, 2019).

Furthermore, studies seem to show that taxation may be more effective compared to other policies to reduce consumption of SSBs. In a study testing various methods to decrease consumption of SSBs such as informing the public and increasing prices to

mimic taxes – the greatest decline in the purchase of soft drinks (26%) was observed during the price increase phase (Block *et al.*, 2010).

Passing legislation for SSB tax however is quite difficult in practice. One article highlights the power of the large soda companies and their control over the media which can prevent the passing of the tax despite large support from the community (García *et al.*, 2017). This was the case in Colombia where the tax was not passed at all. Even when passed, the tax can be challenged. For example, in Norway, the amount of tax on sugar was reduced in 2019 (OECD, 2019). Soda companies shift the conversation from the reduction of calories that the tax would offer to the reduction of jobs that the tax would cause. Thus, to combat this, practices used to pass legislation against tobacco should be followed, which includes increasing dialogue between different state agencies and increasing their commitment, give them responsibility; increasing strategic alliances between non-profit or non-governmental organizations (NGOs), educating actors and updating knowledge of healthcare workers so that they can inform the public (García *et al.*, 2017).

2.3.2. Reducing the price of substitutes

*Substitution effect* has previously been discussed in section 2.2.1 wherein a relationship was seen in certain countries between the prices of water, milk and SSBs and the demand for them. Since SSBs are harmful, one method to decrease the consumption of SSBs is to reduce the price of substitutes making them more attractive. One study looked at the effect of discounting healthier alternatives such as diet soda among aboriginals in Australia. However, no difference in sales was observed probably due to communication and design issues as well as the discount not being large enough (Ferguson *et al.*, 2017). This study was possible since it was localized to a specific region and was conducted in collaboration with a supermarket chain. Otherwise, the strategy of reducing the price of substitutes may be quite complicated to perform.

However, there is one substitute which governments may more easily and should provide at cheaper prices: potable water. Before the implementation of the SSB tax in Mexico, SSBs were purchased as a cheaper substitute of water (Soares, 2016). While the SSB tax has led to a decrease in purchases of SSBs and an increase in the

purchase of water (Bonilla-Chacin *et al.*, 2016) as the price of SSBs increased due to the tax; it can be argued that it would be more beneficial to instead offer safe drinking water at a cheaper price to make it a more attractive substitute. However, there are also downsides to reducing the price of substitutes. While it would lead to decreased demand for SSBs, it would still not compensate for the negative externalities of SSB consumption. The price of SSBs may still not reflect the marginal social cost as indicated in Graph 2.

2.4.3. Increasing the availability of substitutes

This can be done on a governmental level. As previously discussed, before the implementation of the SSB tax in Mexico, SSBs were purchased as a cheaper substitute of water (Soares, 2016). By increasing the availability of substitutes such as increased access to safe drinking water using government policies, the price of water may decrease and thus increase the demand for water would increase; with the overall effect being reduced consumption of SSBs. It can also be done by corporates: for example, consider the drink alternatives available with a Happy Meal (Figure 5). Previously, sodas (carbonated drinks) were the only available drink option and thus consumers had to simply order a soda with their meal. However now, consumers may choose more nutrient-rich SSBs (juices which do have added sugars but are more nutritional) or SSB alternatives such as milk. By increasing the availability of substitutes available, the demand for unhealthy SSBs such as sodas decreases.

2.4.4 Informational campaigns

Some studies suggest that parallel to taxing SSBs, other measures should be implemented such as requiring manufacturers to update food labels to show added sugar (as % of Daily Value of recommended consumption) and educating the public (Lakkakula, 2018). Labels on packets of cigarettes were an important measure to educate the public and to decrease the use of tobacco (García *et al.*, 2017). Education is extremely important since many consumers are unaware of the amount of sugar in SSBs and the impact it can have on their well-being. As previously discussed, SSB manufacturers often downplay the negative health effects of SSBs and instead shift the conversation to job losses due to taxation thus preventing consumers from understanding what is truly at stake (García *et al.*, 2017). Thus, the role of

governments, especially the state departments in charge of the healthcare of its citizens have a crucial role to play.

One study tested different approaches to reducing purchases of regular soda at a specific location such as informing about the risks of over-consumption of SSB and price increase mimicking taxation and observed that education by itself did not decrease sales (Block *et al.*, 2010). This implies that the quality of information is extremely important. Ways in which the quality of information can be improved is by providing more detailed information on how SSBs impact health. Currently, most consumers are aware that SSBs are 'not healthy' (Block *et al.*, 2010), however, they might not have a clear idea about how they impact health such as knowing that SSBs increased the risk of obesity, Type 2 diabetes and even cancer. One way to inform consumers is through warning labels such as those used on cigarette packets (García *et al.*, 2017).

## 2.4 Designing the tax

### 2.4.1 Level of taxation

The first thing to consider when designing an SSB tax is to determine at what level it should be set. It should be high enough to deter the consumption of SSBs and instead promote the consumption of substitutes. Thus, the price of SSBs after tax should be greater than that of healthy substitutes. Furthermore, to be a truly effective Pigouvian tax, it should cover the external healthcare costs of SSBs.

However as taxation leads to a decrease in consumption of SSBs, it would impact the market and some studies argue that the decrease in the market revenue due to the tax would be greater than the tax revenue obtained from the tax (Dharmasena *et al.*, 2014). Another argument when setting the amount of taxes is that the impact on calorie reduction due to an SSB tax is overestimated as supply-side effects are not considered such as the elasticity of the supply-side (Dharmasena *et al.*, 2014).

### 2.4.2 Pass-through effect of tax

Another aspect to consider is the "pass-through" effect of the tax. Currently, most SSB taxes are designed around the principle of charging per gram of sugar/litre. For example, in Berkeley, there is a $0.01/oz SSB tax. Pass-through effect considers how

much of this tax is “passed on” to the consumer. This depends on factors such as initial demand, the number of retailers and number of competitors (Campos-Vázquez and Medina-Cortina, 2019). In Berkeley after implementation of the $0.01/oz SSB tax, price increases relative to those in comparison cities were as follows:

*Table 2 Changes in price/oz for different beverages after implementation of SSB tax in Berkeley (Cawley and Frisvold, 2015)*

| | | |
|---|---|---|
| Smaller beverages | Soda | $0.69/oz |
| | Fruit-flavoured beverages | $0.47/oz |
| | Overall: | $0.47/oz |
| 2-litre bottles | | $0.46/oz |
| multipacks of soda | | $0.49/oz |

There were no relative price increases for untaxed beverages overall. By 3 months after implementation of the tax, SSB retail prices increased more in Berkeley than in nearby cities (Falbe *et al.*, 2015) This implies that a far larger amount of tax/oz was passed onto the consumer in Berkeley compared to the tax experienced by the producer. However, considering the negative price elasticity of SSBs, this implies that a greater amount of reduction in SSB consumption in SSBs may be achieved than initially hypothesized based on the tax amount. In Mexico, the amount of pass-through of the tax was as follows:

*Table 3 Pass-through of SSB tax in Mexico (Campos-Vázquez and Medina-Cortina, 2019)*

| | |
|---|---|
| Soda | mean over shifting of 12% |
| Sports drinks | mean over shifting of 52% |
| Juice | under shifting of 75% |
| Powdered drink mixes | under shifting variations of 76% |

This implies that SSB producers increased the prices of Sodas and Sports drinks greater than the amount of the tax to balance smaller than tax price increases for juices and powdered drink mixes. All these drinks are SSBs. However with the increase in the price of Sodas and Sports drinks, SSB producers may be relying on consumers substituting to juices and powdered drink mixes since they would be relatively cheaper and beverage manufacturers that manufacture sodas, sports drinks, juices and

powdered drink mixes may experience a net neutral effect of the tax. This also implies that the impact of an SSB tax on the price of SSBs may be greater than the tax rate itself. It also shows the power manufacturers of SSBs have to control the increase in prices of their products in relation to tax and thus to control their sales and profits.

### 2.5.3 Types of SSB taxation

*Direct SSB taxation*

The simplest approach for taxation to decrease consumption of SSBs is to tax SSBs. In different parts of the world different approaches have been used to tax SSB. One method of taxing SSBs is taxing the final products based on the amount of sugar – for example the Mexican SSB-tax which charges one-peso-per-litre of SSB. (Bonilla-Chacin *et al.*, 2016). In Berkeley, there is a $0.01-per-ounce tax. Some countries meanwhile divide beverages into different categories based on a certain cut-off amount of sugar/litre. For example, in Portugal, where SSBs are divided into different brackets based on sugar content and products within every bracket being are charged a certain tax rate (OECD, 2019; Goiana-da-Silva *et al.*, 2018) as follows:

*Table 4 Tax rate for sugar per tier in Portugal*

| **Tier** | **Rate** |
|---|---|
| Drinks with sugar content below 80g/L of the final product | €8.22 per 100L |
| Drinks with sugar content above 80g/L of the final product | €16.46 per 100L |

*Indirect taxation – "Sugar tax"*

The most harmful component of SSBs is Sugar. Thus an alternative approach proposed to taxing SSBs is to tax sweeteners at the input level before they are even added to the product (Lakkakula, 2018), a so-called "sugar tax". Taxing at the input level would lead to a greater pressure on producers to switch to non-sugar sweeteners and the impact on the price of SSBs may be greater than for simply taxing SSBs.

However, taxing sugar is not that simple. Sugar is not only input in certain foods and beverages, but it is also used for the production of biofuels (Larson and Borrell, 2001).

Thus, it would have far-reaching consequences. Taxing sugar would also be difficult since sugar could be imported from other countries (Mitchell and Bank, 2004). Sugar is an important part of the consumption basket of the poor and prices have been protected in a lot of countries due to its importance (Mbaye *et al.*, 2015) and thus taxing sugar may not be the best approach. Sugar is income elastic. It is perceived as a *normal good* and as income increases, consumption of sugar increases.

It is deemed to be price-indifferent however its price elasticity is difficult to determine since its price varies so little (Nicita, 2004) thus it is difficult to predict the impact of sugar taxation on SSB consumption. And the impact of a sugar tax may be negligible. A study in the Netherlands, using virtual supermarkets which set different prices depending on different tax conditions found that sugar-tax condition had no significant impact on the number of calories purchased or the amount of sugar purchased as compared to the no-tax condition (Poelman *et al.*, 2017).

*Indirect taxation – "Sugar tax" combined with a cap-and-trade approach.*

Some authors recommend combining a "sugar tax" with a "cap-and-trade" approach using "sugar permits" for added sugars (Basu and Lewis, 2014). The total amount of sugar used in the industry is determined, based on which "sugar permits" are issued. Manufacturers would have to ensure that they have "sugar permits" matching the amount of added sugar in their products. In case their use of added sugars is greater than their number of permits, they have to either acquire permits from manufacturers using lower amounts of sugar or then reduce the amount of added sugar in their products. Over time, the amount of total sugar permitted is reduced, incentivizing firms to switch sugar to alternative sweeteners. It is forecasted that capping the added-sugar by 1% per year would lead reduce obesity by 0.017% and type 2 diabetes by 0.1 percentage point over 20 years and save $9.7 billion in healthcare costs (Basu and Lewis, 2014). Currently, sugar cap and trade approach for limiting sugar in food is not implemented anywhere in the world, however, the concept of cap and trade has been used for limiting and reducing greenhouse gas pollution (OECD.org, n.d.).

### 2.4.4 How fair are the three tax approaches?

One of the most important aspects when designing a tax is to consider its impact on the different members of society. It is crucial that the tax is not regressive and thus

does not negatively impact one income group only. Of the three types of taxes considered, the *sugar tax* may be the most unfair since sugar is an important part of the consumption basket of the poor (Mbaye *et al.*, 2015). *Sugar cap and trade* would be fairer towards the general population as the largest declines in sugar consumption would be experienced by racial and ethnic minorities (Basu and Lewis, 2014). *SSB tax* similarly does benefit the general populace. In Berkeley, the excise tax reduced consumption of SSB in low-income neighbourhoods (Falbe *et al.*, 2016). In the Philippines, it is estimated that the poorest quintile would have the smallest tax burden increase and have the lowest savings (Saxena *et al.*, 2019). Own-price elasticity of demand of sodas (one type of SSB) is elastic in all income quintiles, but it is the third quintile that has the highest elasticity of demand and would benefit the most (Bonilla-Chacin *et al.*, 2016). Thus, the greatest benefit of the tax would be experienced by those currently having the largest demand of SSBs. Currently, more educated individuals and those from higher economic backgrounds purchase and consume more SSBs and would thus benefit the most (Bonilla-Chacin *et al.*, 2016). So, while SSB tax would be more beneficial for people with slightly higher income and educational backgrounds in certain countries, it would still be fair to those from lower-income backgrounds as they would bear a lower tax-burden.

The most important aspect to consider when analysing the fairness of SSB taxation is that SSB taxation function as a nudge towards healthier consumption. This implies that for SSB taxation to be effective and fair, it must be combined with an effort to ensure that there are healthier substitutes available at a reasonable rate. Otherwise, the consumer would be worse off since SSBs would be more expensive and they would have to spend more on substitutes than they previously did on SSBs.

### 2.4.5 Usage of tax revenue by governments

It is stressed in the literature that revenue collected from taxing unhealthy products is reinvested in health-related initiatives (Soares, 2016). Furthermore, it has been shown that in cases where a tax has been set for a specific health cause, using the tax revenue in research or treatment of that cause increases public support (García *et al.*, 2017). Thus, it is very crucial to inform the public of the intended purpose of these tax revenues generated from the tax imposed on SSBs such that they do not view it as a measure to simply obtain additional revenue. There are three suggested uses of

revenue from SSB taxation: First, is ensuring the provision of healthy substitutes to SSBs. Before the SSB tax, in Mexico SSBs were preferred by some as a cheaper substitute to water (Soares, 2016). Thus, it is argued that while taxation reduces SSB consumption, revenue from the tax should be used to improve the provision of safe drinking water. Second, to balance the negative externalities of SSB consumption, revenue from the tax should be used to handle the healthcare costs of SSB consumption reducing the tax burden on non-SSB consumers. Third, the revenue should be used to increase awareness of the risks of SSBs and to inform consumers of the healthcare costs of SSBs such as through informational campaigns such as the following poster by the Boston Public Health Commission:


*Figure 10 Poster by Boston Public Health commission showing how often to drink different types of drinks (Boston Public Health Commission, 2013)*

### 2.5 Summary and conclusions

The causes of excessive SSB consumption are economic factors, socioeconomic factors, cultural factors and psychological factors. Currently, the most implemented practices to reduce the consumption of SSBs are SSB tax, Sugar tax and Informational campaigns. No study was identified that empirically investigated the impact of Sugar

tax and Soda tax policies on the consumption of the SSBs while controlling for the factors that impact the consumption of SSBs.

## 3.METHODOLOGY OF PROPOSED STUDY

In the literature review, a research gap was identified. Currently, no study exists which compares the effects of sugar taxation and SSB taxation. Given the time frame for the execution of this thesis, this paper aims to design and present a methodology for a study to evaluate the impact of sugar taxation and SSB taxation on SSB consumption which may then be performed in the future. The requirements for the proposed study are that it allows for quantitative comparison of the impact on SSB consumption, as well as, analysis of the relationship between factors that impact consumptions of SSBs and the reduction in consumption of SSBs. (Malik *et al.*, 2019). By observing the results of the proposed study and the type of substitutes preferred, policymakers would be in a better position to determine if an SSB tax or a Sugar tax would lead to overall better health.

The proposed setting for the study is in Sweden and it is suggested that the study be conducted in collaboration with a retailer. Currently, Sweden has no SSB or Sugar tax. For this study, a fictional retailer, Supermarket S is used. In this chapter, the methodology of the study will be outlined. Discussion of the variables, setting, choice of key actors involved in the study, and analysis of the methodology will be examined in chapter 4.

### 3.1 Study design and procedure

The study aims to compare the change in the purchase of an amount of SSBs due to Sugar taxation and SSB taxation by randomly assigning participants to either an SSB tax condition or a Sugar tax condition and observing their purchases in a webshop. The study design process is based on a previously published study (Poelman *et al.*, 2017).

Instead of using a control group to observe the effects of tax condition compared to no tax condition, this study would use the data already obtained by Supermarket S which shows the amount of SSBs purchased in the current, no tax condition. The participants' purchase of SSBs in the webshop conditions will be compared to their current level of

SSB purchases (obtained from the Supermarket S transaction history) and the relative change of the amount of SSBs purchased in either condition will be compared. The strengths and limitations of the study design will be discussed in chapter 4. The study design can be described as "repeated measures" as the outcomes (number of SSBs purchased) are compared at different times in different conditions (no tax and either sugar/SSB tax condition) (Salkind (ed.), 2010).

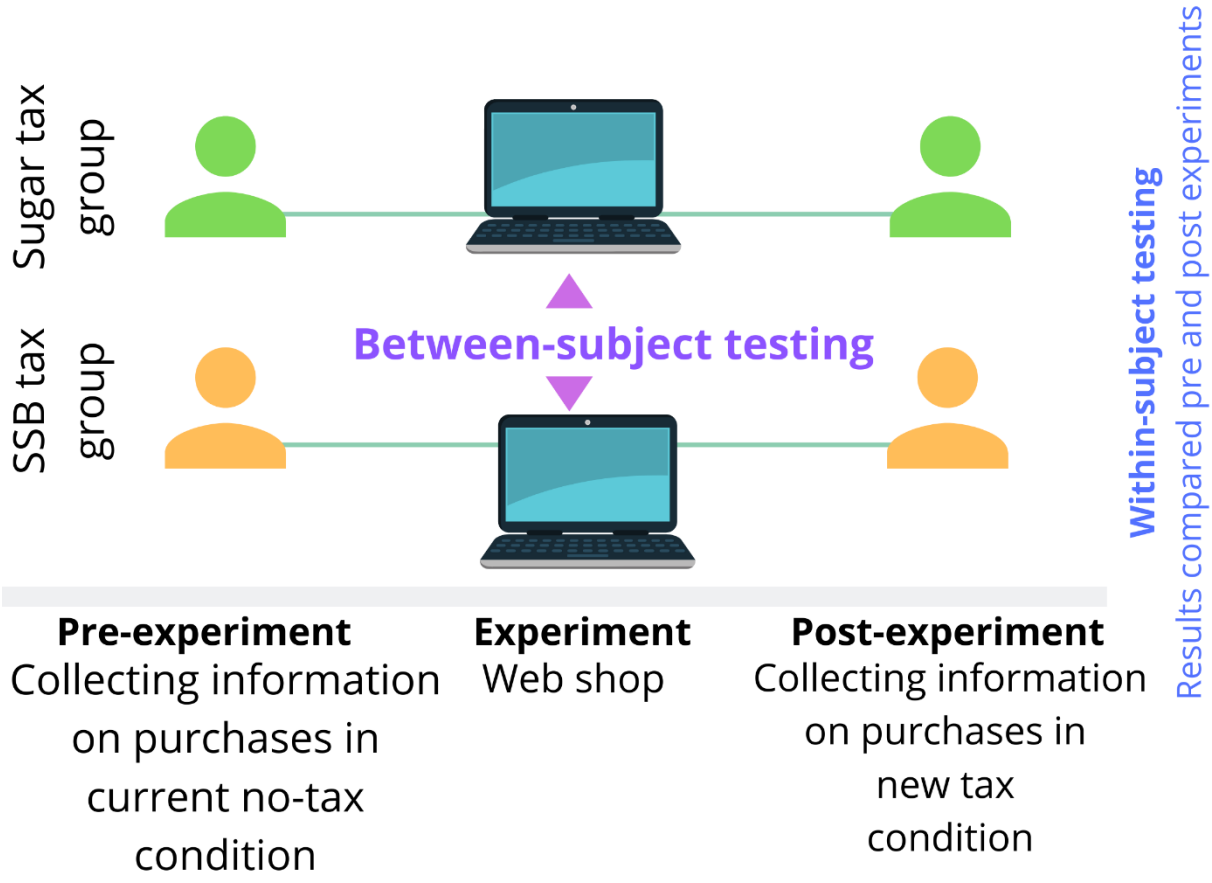



*Figure 11 The study design. Author's illustration made using Canva*.

This study involves between subject testing: the results of the SSB tax group and the Sugar tax group will be compared to each other. This study also uses within-subject testing: to see the changes in SSB purchases post taxation, the purchases of each individual will be compared to pre-experiment conditions.

### 3.2 Participant recruitment

To maximize the number of participants, all loyalty cardholders of Supermarket S will be eligible to participate in the survey. Thus, the entire sample would consist of all loyalty cardholders of Supermarket S. These customers would first be stratified based upon subgroups of age and then randomly assigned to either tax condition, ensuring

an equal number of participants in both conditions from each age group. See the following image:

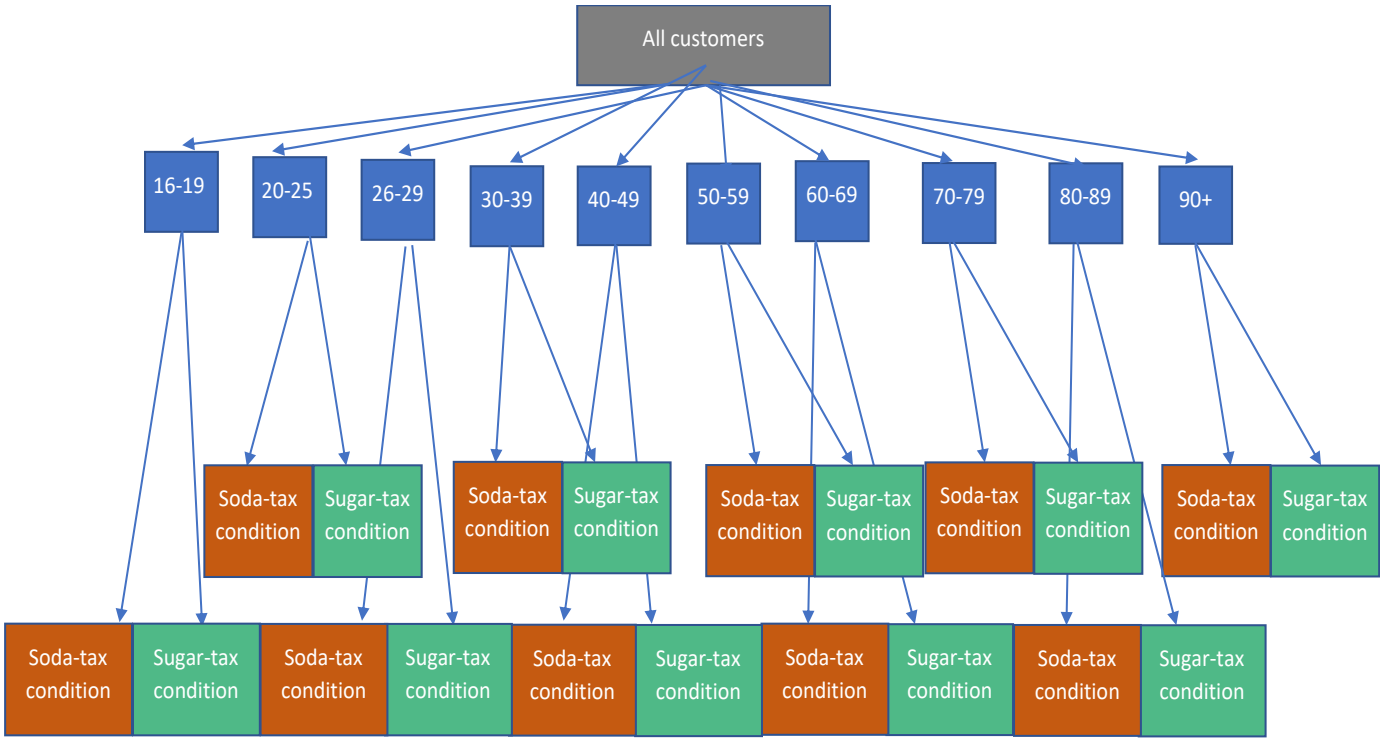



*Figure 12 The sampling process. The initial stratification is based on age in years.*

Participants would then receive an email informing along with the specific web link which grants access to the simulated webshop that is crafted based upon their tax condition that they are assigned. As an incentive for participation, participants would have a chance to win vouchers worth 500 SEK at supermarket S.

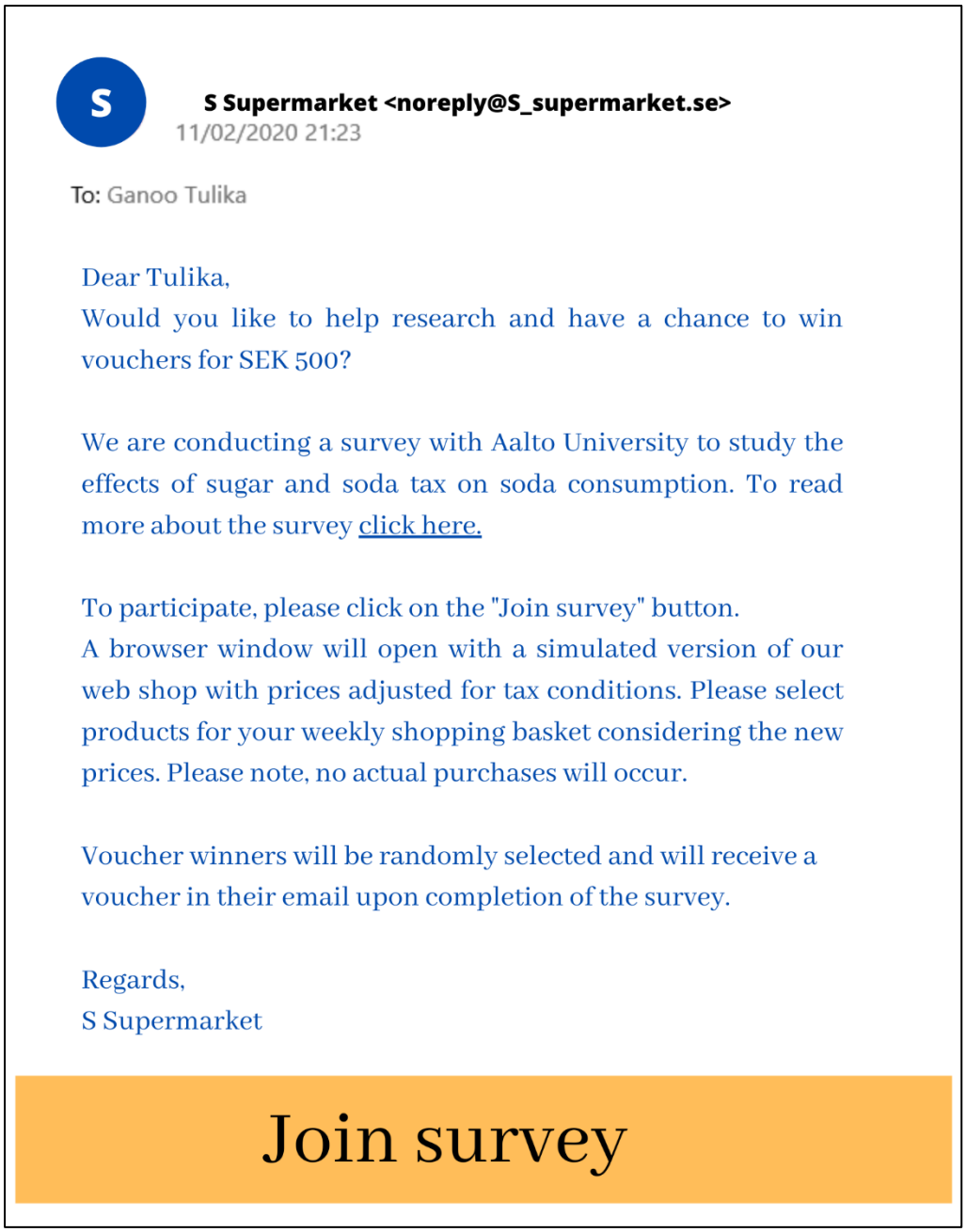



*Figure 13 Sample email used to recruit participants for the proposed survey*

### 3.1 Webshop

The study methodology is based on a previously published study design (Poelman *et al.*, 2017). To adapt the design for current purposes, the study is proposed to be conducted with the help of a webshop. A webshop is an online website offered by most retailers whereby customers can purchase products by first clicking on them, then making an online payment and then finally collecting the product(s) either in-store or delivered to their home. The following image shows how the webshop in the proposed study would look like.

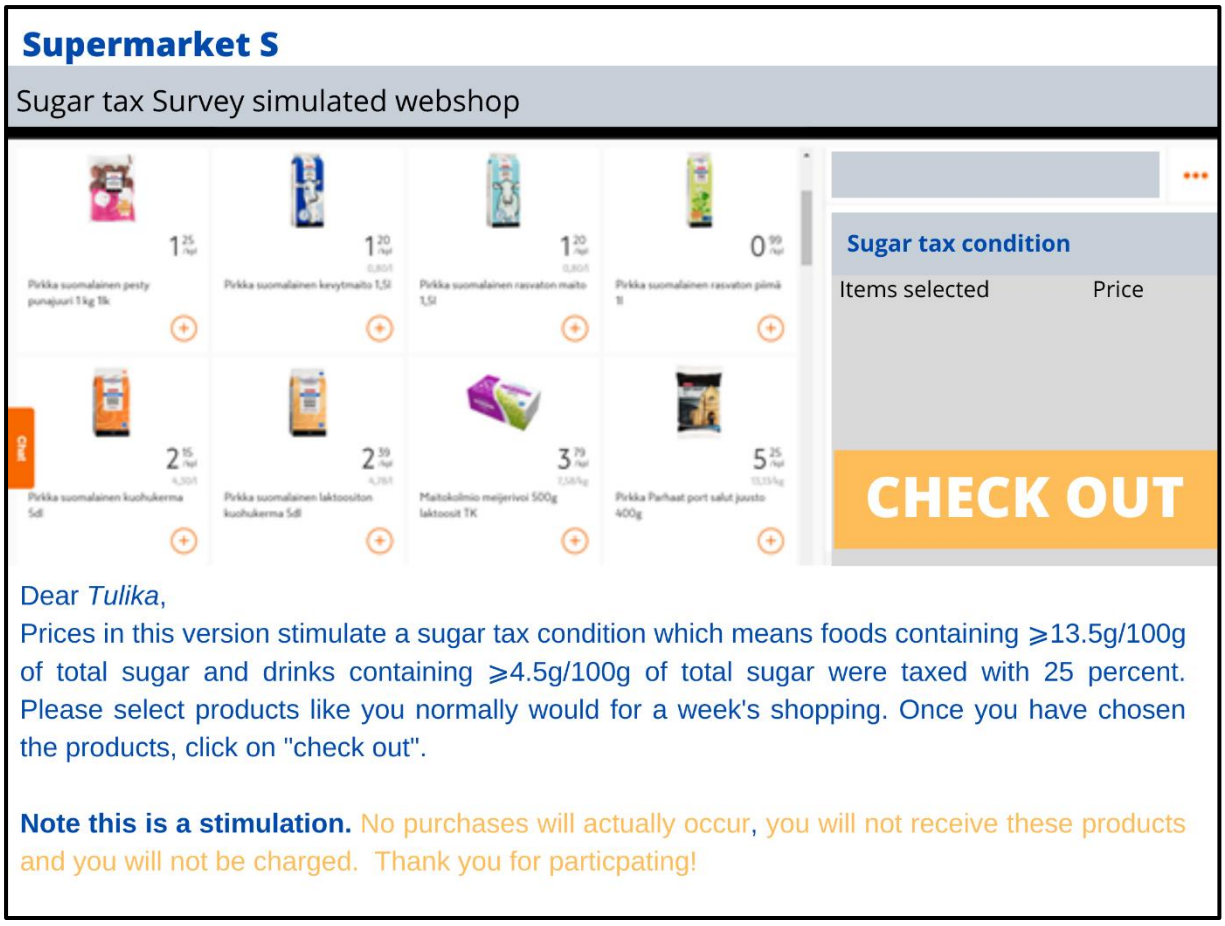



*Figure 14 The proposed look of the webshop. Adapted from the webshop of a Finnish retailer (K Ruoka, n.d.)*

The webshop would consist of all stock that is available on Supermarket S's website with prices adjusted for the actual tax condition. In this study, the two tax conditions studied are Sugar tax and an SSB tax. As supermarkets databases have all information about products, it would be relatively simple to classify products based on the number of total sugars and then calculating the change in prices. A new database with all products offered by Supermarket S would be created for each tax condition. Based on the infrastructure of the database, it might be reasonably simple to code that products matching specific criteria of the tax have their prices adjusted based on the rule of the tax. It would be fairly easy to replicate the webshop of Supermarket S especially since no transaction feature is required and the items would refer to the new database.

As in the study by Poelman et al. (2017), the simulated webshop would inform participants of the tax condition that they were assigned and how it would change

prices. This is to simulate real-life conditions where customers are aware of changes in tax policies. Participants would be asked to select items for a week's worth of groceries and then choose "check out", whereby they would receive a questionnaire (see Appendix, 7.1) for questions regarding demographic data, data relating to lifestyle and data on participant's impulsiveness(Patton *et al.*, 1995), and price-perception (Lichtenstein *et al.*, 1993) based on and then the survey would end. These questionnaires were also used in Poelman et al. (2017).

### 3.2 Setting prices for each tax condition

To demonstrate the effect of each tax policy in practice, certain common SSBs were chosen and their price in the webshop of one of Sweden's main retailers, ICA was taken as of 7th March 2020. The webshop was linked to their store, "ICA Strömpilen", located in Umeå. Similar price changes are proposed for the actual study.

**SSB tax condition:**

In this study, the effect of the SSB tax in Berkeley, California would be used to model the effects of SSB tax which is $0.01 per 1 oz of sugar. The pass-through rate is assumed to be the same as observed in Berkeley (Cawley and Frisvold, 2015). For more information, please refer to Table 2. For these examples, it is assumed that 1000g = 1 L, $1 = SEK 10 and that the tax amount and passthrough amount is the same, the prices are adjusted accordingly.

*Table 5 Calculation of new prices of certain SSBs based on the SSB model used in Berkeley and the pass-through rates observed*

| |  Apelsinjuice 2l Bravo **26,95 kr** |  Läsk Coca-Cola 2l **22,95 kr** |  Energidryck Tropical edition 25cl Red Bull **14,50 kr** |
|---|---|---|---|
| **Added Sugar:** | 9g/100g;0.32oz. Total: 6.4oz | 10.6g/100g,0.37oz. Total: 7.4 oz | 11g/100g,0.39oz. Total: 0.98 oz |

| | | | |
|---|---|---|---|
| **New price considering the tax rate** | 27.59 kr[1] | 23.69 kr | 14.60 kr |
| **New price considering passthrough rate** | 2-liter bottle ($0.46/oz): 56.39 kr[2] | 2-literbottle ($0.46/oz): 56.99 kr | Overall, small beverage $0.47/oz): 19.11 kr |
| |  Prepare Passionsfrukt 50 cl Vitamin Well **18,90 kr** |  Iste Svart Persika Hibiskus 40cl Fuzetea **15,95 kr** |  Fruktsmoothie Mango & apelsin 750ml Froosh **33,95 kr** |
| **Added sugar:** | 4.2g/100g;0.15oz Total: 0.75oz | 4.3g/100g; 0.15oz Total: 0.6oz | None; only natural sugars from fruits |
| **New price considering the tax rate:** | 18.98 kr | 16.01 kr | 33.95 kr |
| **New price considering the pass-through rate** | Smaller beverage, fruit flavoured ($0.47/oz): 22.43 kr | Smaller beverage, fruit flavoured ($0.47/oz): 18.77 kr | 33.95 kr |

**Sugar-tax condition**

[1] Original price + (0.1 kr * oz of sugar) => 26.95 + 0.1(6.4) => 27,59 kr
[2] Original price + pass-through rate ($0.46/oz = 4.6kr/kr) => 26.95 + 4.6(6.4) => 56,39 kr

For this tax-conditions, the prices will be modelled based on the sugar-tax model and pricing used in the (Poelman *et al.*, 2017) wherein "Foods containing ⩾13.5g/100g of total sugar and drinks containing ⩾4.5g/100g of total sugar were taxed with 25 per cent". Assuming 100% pass-through of the tax to the customer, sample changes in prices based on this model would be:

*Table 6 Calculation of new prices of certain SSBs based on the sugar tax model*

| |  Apelsinjuice 2l Bravo **26,95 kr** Jfr-pris 13,48 kr/l |  Läsk Coca-Cola 2l **22,95 kr** |  Energidryck Tropical edition 25cl Red Bull **14,50 kr** |
|---|---|---|---|
| **Added sugar** | 9g/100g | 10.6g/100g | 11g/100g |
| **New price:** | 33,69 kr[3] | 28,69 kr | 18,13 kr |
| |  Prepare Passionsfrukt 50 cl Vitamin Well **18,90 kr** |  Iste Svart Persika Hibiskus 40cl Fuzetea **15,95 kr** |  Fruktsmoothie Mango & apelsin 750ml Froosh **33,95 kr** Jfr-pris 45,27 kr/l |
| **Added sugar** | 4.2g/100g | 4.3g/100g | No added sugar; only fruit. |
| **New price:** | 18,9 kr | 15,95 kr | 33,95 kr |

[3] 9g sugar/100 g => 25% tax rate => Original price * 1,25 => 26,95 * 1,25 => 33,69 kr

### 3.4 Variables studied

The outcome studied would be the number of SSBs purchased (number of SSBs selected in the simulated webshop) as well as the proportion of the weekly basket that consists of SSBs.

*Table 7 The variables studied and how they would be obtained*

| **Simulated webshop** | **Customer history/ Customer information already obtained by Supermarket S** | **Questionnaire** |
|---|---|---|
| • Number of SSB purchased post taxation<br>• What proportion were SSBs of the weekly basket ($) post taxation<br>• Number of SSB substitutes purchased post taxation | • Number of SSBs purchased pre taxation<br>• What proportion were SSBs of the weekly basket ($)<br>• Customer's age<br>• Customer's previous shopping details<br>• Customer's geographical location<br>• Customer's gender | • Income group the customer belongs to<br>• Customer's education level<br>• Lifestyle factors (alcohol consumption, diet, smoking, exercise, BMI)<br>• Impulsiveness and price perception |

The amount and the proportion of SSBs purchased in the simulated webshop would be compared to previous purchases (the 'no-tax' condition). To test for the accuracy of the responses, the respondents will be asked to confirm how well their purchases in the webshop reflected their actual purchases. This method was also used by *Poelman et al*.

## 4. DISCUSSION AND ANALYSIS OF PROPOSED STUDY

### 4.1 Discussion of the methodology

The study methodology is based on the study design of (Poelman *et al.*, 2017) which used a 3D virtual supermarket to study the impact of three taxation policies: sugar tax, saturated fat tax and a nutrient profiling tax.

*Choice of setting:*

Currently, Sweden does not have sugar tax or SSB tax. Thus, the pre-experiment requirement of the no-tax condition of the proposed study is fulfilled and the effects of the tax conditions in the experiments can be compared to the current no-tax condition. Secondly, the use of loyalty cards is common: 85% of the population between 20-60 years, have at least 1 loyalty card (Ström Melvinger, 2007). One of the largest retailers in Sweden, Coop has 3.5 million members (Coop, n.d.). Thus, it is possible to gain a large sample simply by contacting loyalty cardholders of a retailer. Third, most retailers in Sweden have webshops and most customers are used to using webshops for online purchases. Thus, using webshops would be possible. This and the fact that webshops may be cheaper are the reason that the experiment utilizes a webshop instead of a virtual supermarket as utilized in the previous study (Poelman *et al.*, 2017).

*Taxes studied and Setting prices for each tax condition:*

The study focuses on Sugar tax and SSB tax since these are the taxation policies currently implemented to reduce consumption of SSBs and thus can answer the third research question of this thesis. It does not test for the Sugar-cap-and-trade condition since it is not currently implemented anywhere in the world. Like the previous study (Poelman *et al.*, 2017), the proposed study suggests informing the respondents about the tax condition they have received to emulate conditions in real life where citizens would be informed about a tax and its effect on prices. This also follows the principles of experimental economics where participants are fully informed of the condition that they are subjected to (Hertwig and Ortmann, 2001). The questions suggested for use in the survey are also based on those employed in Poelman's study.

SSB tax condition:

In this study, the effect of the SSB tax in Berkeley, California would be used to model the effects of SSB tax (Falbe *et al.*, 2016). The income levels, consumption culture of SSB and number of suppliers and retailers of SSB between Berkeley and in Sweden are quite similar. Note but there are some limitations with this parallel: The tax in California was limited to a small region and consumers could easily travel to other regions to purchase SSBs at non-tax prices. Meanwhile, for a country-wide tax, it is unlikely that customers would travel to other regions to have tax-free SSBs. The proposed study relies on the assumption that prices of goods in Sweden and Berkeley are comparable and the tax-rate applied would be identical.

Sugar tax condition:

This condition is modelled using the condition used in the Poelman study (Poelman *et al.*, 2017) which was conducted in The Netherlands. The application of the model to Swedish market conditions seems reasonable as both are countries within the EU and have similar income levels.

*Outcomes studied:*

The outcomes that *Poelman* studied were the amount of energy (kcal), saturated fat (gram) and sugar (gram) purchased for a one-week food basket. The proposed study would also consider purchases for a one-week food basket; however, the outcomes studied would be changes in the number of SSBs purchased. While SSBs are a major source of calories and sugar, and the impact of SSB/Sugar taxation would be reduced SSB and sugary goods consumption and thus reduced-calorie and sugar consumption, the purpose of the proposed study is to instead solely focus on the impact on the number of SSBs consumed. The current outcomes are chosen based on the research objective and questions of this thesis which is to analyse the impact of policies to reduce SSB consumption and to contribute to filling the current research gap of no empirical studies comparing the effects of Sugar Tax and SSB tax on SSB consumption compared to no-tax condition.

*No control groups*

Unlike most randomized studies, the proposed study would not have a control group. Control groups are utilized to analyse the effects of an intervention compared to a no-intervention situation. However, as there is currently a no-tax condition in Sweden, the post-experiment results can be compared to the pre-experiment conditions to study the impact of both tax conditions (see figure 10). This method is referred to as “within-subjects” design. The advantage of it is that “the change within a person between two measurements carries greater statistical accuracy than reliance on between-group changes. The increased accuracy of the estimation provides greater statistical power in an analysis with far fewer participants.” (Allen (ed.), 2017).

*Cooperation with retailers*

While signing up as loyalty cardholders, customers provide information such as their city of residence, their age and gender. Working with a retailer would reduce the need to ask respondents for these details since they are pre-provided and would enable a shorter survey response time and increase the probability that customers would complete the survey.

Retailers also store customers' data for every purchase that the customer makes, including the frequency of shopping, the time of day and the time of the week. This can help deduce the reasonings for the purchases. For example, one could see if SSBs are currently purchased every week (suggesting they are a part of the diet) by most customers or if they are purchased occasionally (suggesting that they are distinct drinks for certain occasions). Another benefit of co-operating with retailers is to get accurate numbers of the amount of consumption of SSBs: in the process of this thesis, it was apparent that it is difficult to accurately estimate the amount of SSBs consumed. Furthermore, estimating the amount of SSBs consumed based on the type of SSBs (sodas, juices with added sugars, energy drinks or flavoured water) is near impossible.

*Ethical considerations:*

The survey would be entirely voluntary. Participants would only participate for a chance to receive vouchers. All data would be anonymized, only the information regarding the variables needed would be stored. All personally identifying data would be removed before data processing. While some data (such as specific brands and specific age-groups) would be beneficial to the retailer and may not be released due to competition concerns, it would not be harmful to any parties involved. It could be considered as market research. More generalized data (grouping beverages, income ranges, age ranges) may be published and would be beneficial for national planning.

### 4.2 Choice of variables

The choice of variables had to be fairly limited to ensure that the survey took minimal time for the participants to increase the rate of participation. Thus, the variables chosen were ones identified in the literature review to impact SSB consumption such as demographic factors, cultural factors, income levels and psychological factors.

Consumption of SSBs is impacted by demographic factors such as geographical location, income, education, age and gender. Thus, it crucial to obtain data for these variables to control for them when comparing both tax conditions. To test the impact of socioeconomic factors, the proposed study obtains or uses previously obtained information regarding the participant's demographic data. By categorizing for these factors, hypothesis such as, "Are SSB normal goods?" and "Would the tax be regressive or impact a specific group negatively?" could be confirmed. If SSBs are a normal good the amount of SSBs purchased would increase depending on the consumer's income level. By seeing how consumption patterns change depending on educational backgrounds, income backgrounds, geographical location and age, the population could be segmented, and more targeted informational campaigns could be designed for the segments that require them.

By analysing the type of SSBs (Energy drinks, sodas, mineral water and juices) most consumed by different age groups, the information provided regarding SSBs could be better adapted. It would also enable governments to see if they should put into effect certain marketing restrictions, for example, if energy drinks or sports drink are the most common SSBs consumed by younger consumers, the government could have specific informational campaigns for youths regarding the risks of these drinks as well as require drink manufacturers to have warning labels and prevent them from being sold to younger consumers.

To enable comparison of choice of substitutes among different income groups, the consumption of SSBs and substitutes pre and post taxation could be compared while categorizing for income. It would also enable comparison in consumption pre and post taxation to see if income groups react differently to taxation: what percentage would substitute consumption of SSBs and to see if the choice of substitutes would be different for different consumers. For example, in Mexico, it was observed that people from the lowest and highest income quintiles substituted to water meanwhile people in the middle quintile substituted to milk (Bonilla-Chacin *et al.*, 2016). It would thus be interesting to study the kind of substitutes that different income groups choose and to see if certain income groups choose healthier vs non-healthier substitutes. It would also display the cross-price elasticity of other goods.

### 4.3 Strengths of the proposed study

Using a nationwide retailer that exists in different parts of the country could allow for comparisons between regions and see a more national effect. Since the study is virtual, it is not limited to a specific location. Since members already have registered certain personal information, the survey would not be as time-consuming for them and thus would potentially have low fall out rate.

All customers are stratified based on age group because the literature indicates that age is a crucial factor in the excessive consumption of SSBs. By being able to analyse the impact of both taxation methods on different age groups, policymakers would be able to determine if either taxation method would be unfair towards a certain age group. This is especially crucial since younger participants, with lower incomes may experience a greater impact of the taxation. Spending patterns of younger participants would be different than for older participants. Policymakers may then determine if targeted informational campaigns would be more effective than taxation.

Knowing the amount of current consumption and changes in consumption after taxation for different SSB (sodas, juices with added sugars, energy drinks or flavoured water) is essential for identifying the SSBs that are most popular. If consumption of certain SSBs does not decrease post-taxation, it may indicate that either those types of SSBs are considered more essential (normal goods) or that consumers are not aware that these SSBs may be harmful.

### 4.4 Limitations of the proposed study and suggestions for improvement

Unfortunately using a webshop may prevent certain users from being able to undertake the survey. However, by knowing the ages and backgrounds of participants, it would be easy to determine how results have been affected due to the loss of participants. There is also a risk that participants may not provide entirely truthful answers due to time constraints. This would be controlled by checking the correlation of the items selected for a week in the simulated webshop and the average amount and type of items purchased by the customer based on their transaction history.

The sample might not be a representative of Sweden’s population, but the sample gathered will be a representative of the population of the customers in this

supermarket. This is because it might happen that some persons with certain characteristics will not be visiting this supermarket or will not be the members of this retailer. This could be controlled by comparing the demographic characteristics of the participants and comparing them to the demographics of the entire nation and thus adjusting the results.

The proposed methods to test the effects of a Sugar tax and SSB tax are based on currently available models. However, it may be that policymakers may choose to implement a variation of these taxation models. In that case, the methodology of the proposed study is simple enough to adjust the prices based on other alternative taxation methods.

### 4.5 Stakeholders involved and the implications of the study for them

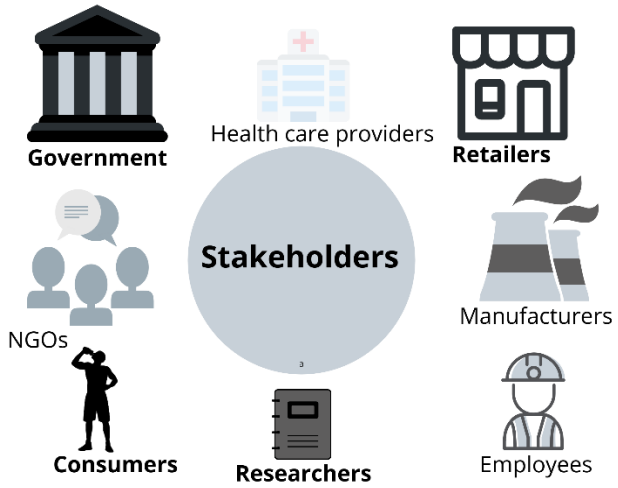



*Figure 15 Stakeholders involved in the proposed study. Key stakeholders are bolded. Author's illustration produced with Canva using icons available as part of creative commons.*

The key stakeholders in the proposed study would be Policymakers (that would make decisions regarding taxation based on the results), Consumers (that would participate in the study and that would be most impacted by the results of the study), Researchers (that would conduct the study) and Retailers (that would help conduct the study). Other stakeholders impacted by the study would be NGOs, manufacturers of SSBs, health care providers and employees in the retail and manufacturing of SSBs and SSB substitutes.

**For retailers:**

The research would also be beneficial for because a sugar tax or SSB tax would have large consequences as it would impact the number of sales it would have. The profit margin/sale would also be impacted as the suppliers may try pushing the cost onto retailers. Studying the impact on purchases beforehand would allow retailers to be better prepared for any tax change. It would also help retailers study consumption patterns for SSBs and see the income elasticity and price elasticity of SSBs. By seeing what kind of substitutes are chosen, retailers could also better prepare as well as have a better bargaining position with suppliers. Based on current purchase patterns at current price levels, a demand model could be estimated using the yearly, monthly or daily data on individual consumer's spending patterns, and the income and price elasticities of demand could be calculated. Seeing which substitutes are more popular among different income groups would enable producers of SSBs and other beverages and retailers to adapt their product to match market needs.

**For consumers:**
Consumers would benefit from partaking in the study since they can see how they would be impacted.

**For research:**
This proposed study would enable comparisons related to socioeconomic factors and test if correlations seen between socioeconomic factors and SSB consumption in certain countries hold in other countries. It also offers a shift in the way economics research may be conducted by suggesting cooperation with retailers. The results would also help confirm the price-elasticity and income-elasticity of SSBs in Sweden.

**For policymakers:**
While Sweden might not implement a sugar or SSB tax, the results obtained would still allow policymakers in other countries to consider the impact of taxation on the overall population and compare the two methods. The proposed study would also be valuable since the results would be transferrable to other countries in the EU which have similar consumption cultures and income levels

Another important aspect is that it would allow policymakers to see the substitutes preferred by consumers. While this thesis has presented the dangers of SSBs, note

that not all substitutes of SSBs are healthy. For example, a higher intake of Artificial Sweetened beverages, such as sodas sweetened with sweeteners is correlated with total and cardiovascular mortality (Malik *et al.*, 2019). By observing the results of the proposed study and the type of substitutes preferred, policymakers would be in a better position to determine if an SSB tax or a Sugar tax would lead to overall better health.

## 5. CONCLUSIONS

### 5.1. Summary of main findings

The determinants of SSB consumption are economic factors (the price of SSBs, price of SSB substitutes and income), demographic factors (age, gender, racial background, education level, lifestyle factors and geographic location), psychological factors (such as impulsivity) and cultural factors (cultural beliefs regarding consumption of SSBs). Current nation-wide policies implemented to reduce consumption of SSBs are informational campaigns, SSB tax and Sugar tax. No study comparing the impact of SSB tax and Sugar tax on SSB consumption while controlling for the determinants of SSB consumption was identified. This thesis offers a methodology for a study to be conducted by health care departments in collaboration with retailers to study the impact of both taxation methods and allow policymakers to make an informed decision on which method to employ.

### 5.2. Implications for international business

The results of the proposed study would directly impact international businesses involved in SSB and SSB substitute manufacturing and retail. The suggested collaboration of businesses (retailers) and governments to test and solve economic issues is a novel approach and may contribute to changing the perception of retailers contributing to solving economic questions. The proposed study is based on methodologies employed in experimental medical science research (utilization of repeated measures study) which have not been widely applied in economics research and thus would be a contribution to the current economics and business literature.

### 5.3. Limitations and suggestions for further research

Due to a limited time frame, the study outlined in this thesis has not been tested and it is hoped that future research may be conducted to evaluate whether SSB taxation or

Sugar taxation is more effective in reducing consumption of SSBs. Further, collaboration with retailers and using methodologies employed in other fields are future avenues of research.

## 6. REFERENCES

Allen, M. (ed.). (2017). 'Within-Subjects Design'. In: The SAGE Encyclopedia of Communication Research Methods, 2455 Teller Road, Thousand Oaks California 91320: SAGE Publications, Inc [Online]. doi:10.4135/9781483381411.n675 [Accessed: 4 April 2020].

Basu, S. and Lewis, K. (2014). 'Reducing Added Sugars in the Food Supply Through a Cap-and-Trade Approach'. American Journal of Public Health; Washington, 104 (12), pp.2432–2438 [Online]. Available at: http://search.proquest.com/abicomplete/docview/1628902843/abstract/D0856409A6734675PQ/38 [Accessed: 3 December 2019].

Block, J. P., Chandra, A., McManus, K. D. and Willett, W. C. (2010). 'Point-of-Purchase Price and Education Intervention to Reduce Consumption of Sugary Soft Drinks'. American Journal of Public Health; Washington, 100 (8), pp.1427–1433 [Online]. Available at: http://search.proquest.com/abicomplete/docview/650684367/abstract/D0856409A6734675PQ/64 [Accessed: 3 December 2019].

Bonilla-Chacin, M. E., Iglesias, R., Suaya, A., Trezza, C. and Macías, C. (2016). Learning from the Mexican Experience with Taxes on Sugar-Sweetened Beverages and Energy-Dense Foods of Low Nutritional Value: Poverty and Social Impact Analysis. World Bank [Online]. doi:10.1596/24701 [Accessed: 21 January 2020].

Brodwin, D. (2012). 'Why We Need the Government in the Marketplace'. U.S. News, 21 December [Online]. Available at: https://www.usnews.com/opinion/blogs/economic-intelligence/2012/12/21/why-we-need-the-government-in-the-marketplace [Accessed: 7 March 2020].

Coca-Cola. (n.d.). Eid Mubarak! [Online]. Available at: https://scontent.fhen1-1.fna.fbcdn.net/v/t1.0-9/s960x960/61869005_888906808120021_418049847187210240_o.jpg?_nc_cat=103&_nc_sid=8024bb&_nc_ohc=LbAokRtj4zUAX_FFs5u&_nc_ht=scontent.fhen1-1.fna&_nc_tp=7&oh=704f0d6e92fec1f2b082da5621bd8135&oe=5EA8746B [Accessed: 1 April 2020].

Colchero, M. A., Rivera-Dommarco, J., Popkin, B. M. and Ng, S. W. (2017). 'In Mexico, Evidence Of Sustained Consumer Response Two Years After Implementing A Sugar-Sweetened Beverage Tax'. Health Affairs; Chevy Chase, 36 (3), pp.564–571 [Online]. doi:http://dx.doi.org/10.1377/hlthaff.2016.1231 [Accessed: 3 December 2019].

Coop. (n.d.). 'Om Coop'. Coop [Online]. Available at: https://www.coop.se/globala-sidor/om-coop/ [Accessed: 7 March 2020].

Dharmasena, S., Davis, G. C. and Capps, O. (2014). 'Partial versus General Equilibrium Calorie and Revenue Effects Associated with a Sugar-Sweetened Beverage Tax'. Journal of Agricultural and Resource Economics; Logan, 39 (2), pp.157–173 [Online]. Available at: http://search.proquest.com/abicomplete/docview/1613193773/citation/3971C33A0F6F4119PQ/84 [Accessed: 25 November 2019].

Elfhag, K., Tynelius, P. and Rasmussen, F. (2007). 'Sugar-sweetened and artificially sweetened soft drinks in association to restrained, external and emotional eating'. Physiology & Behavior, 91 (2–3), pp.191–195 [Online]. doi:10.1016/j.physbeh.2007.02.005. [Accessed: 7 March 2020].

Falbe, J., Rojas, N., Grummon, A. H. and Madsen, K. A. (2015). 'Higher Retail Prices of Sugar-Sweetened Beverages 3 Months After Implementation of an Excise Tax in Berkeley, California'. American Journal of Public Health; Washington, 105 (11), pp.2194–2201 [Online]. Available at: http://search.proquest.com/abicomplete/docview/1723084421/abstract/D0856409A6734675PQ/36 [Accessed: 3 December 2019].

Falbe, J., Thompson, H. R., Becker, C. M., Rojas, N., McCulloch, C. E. and Madsen, K. A. (2016). 'Impact of the Berkeley Excise Tax on Sugar-Sweetened Beverage Consumption'. American Journal of Public Health; Washington, 106 (10), pp.1865–1871 [Online]. doi:http://dx.doi.org/10.2105/AJPH.2016.303362 [Accessed: 3 December 2019].

Ferguson, M., O'Dea, K., Holden, S., Miles, E. and Brimblecombe, J. (2017). 'Food and beverage price discounts to improve health in remote Aboriginal communities: mixed method evaluation of a natural experiment'. Australian and New Zealand Journal of Public Health; Richmond, 41 (1), pp.32–37 [Online]. Available at: http://search.proquest.com/abicomplete/docview/2290237464/abstract/D0856409A6734675PQ/28 [Accessed: 3 December 2019].

Fismen, A.-S., Smith, O. R. F., Torsheim, T., Rasmussen, M., Pedersen Pagh, T., Augustine, L., Ojala, K. and Samdal, O. (2016). 'Trends in Food Habits and Their Relation to Socioeconomic Status among Nordic Adolescents 2001/2002-2009/2010'. PLoS ONE, 11 (2), pp.1–15 [Online]. doi:10.1371/journal.pone.0148541 [Accessed: 21 January 2020].

García, M. I., Uribe, M. V. and Lunes, R. (2017). 'The political economy of the 2016 tobacco and proposed sugar sweetened beverage tax increases in colombia'. World Bank Group, pp.40 [Accessed: 15 March 2020].

Gupta, A., Smithers, L. G., Braunack-Mayer, A. and Harford, J. (2018). 'How much free sugar do Australians consume? Findings from a national survey'. Australian and New Zealand Journal of Public Health; Richmond, 42 (6), pp.533–540 [Online]. Available at: http://search.proquest.com/abicomplete/docview/2266268017/abstract/D0856409A6734675PQ/6 [Accessed: 3 December 2019].

Habanero Grill and Cantina. (2018) [Online]. Available at: https://scontent.fhen1-1.fna.fbcdn.net/v/t1.0-9/s960x960/48230412_464815803923275_8232220874883727360_o.jpg?_nc_cat=

111&_nc_sid=110474&_nc_ohc=suu_sRLexnMAX_DM4Bx&_nc_ht=scontent.fhen1-1.fna&_nc_tp=7&oh=4d60718a0be34f30794dcda2278bd3a5&oe=5EAAFAA4 [Accessed: 1 April 2020].

Hertwig, R. and Ortmann, A. (2001). 'Experimental Practices in Economics: A Methodological Challenge for Psychologists?'. Behavioral and Brain Sciences, 24 (3), pp.383–403 [Online]. doi:10.1017/s0140525x01004149.

Jones, A. C., Veerman, L. and Hammond, D. (2017). THE HEALTH AND ECONOMIC IMPACT OF A TAX ON SUGARY DRINKS IN CANADA [Accessed: 4 April 2020].

K Ruoka. (n.d.). 'K Citymarket'. K Ruoka [Online]. Available at: https://www.k-ruoka.fi/kauppa?gclsrc=aw.ds&gclid=EAIaIQobChMI_9qRvM2S6AIVlPhRCh1CWwR5EAAYASAAEgLSsPD_BwE&gclsrc=aw.ds. [Accessed: 25 February 2020].

Kaplow, L. (2008). The theory of taxation and public economics. Princeton, N.J: Princeton University Press

Kumar, N. and Ray, S. (2018). 'Attitude towards soft drinks and its consumption pattern: a study of Gen Y consumers of India'. British Food Journal; Bradford, 120 (2), pp.355–366 [Online]. doi:http://dx.doi.org/10.1108/BFJ-05-2017-0320 [Accessed: 3 December 2019].

Kumar, S. (2008). 'A study of the supermarket industry and its growing logistics capabilities'. International Journal of Retail & Distribution Management, 36 (3), pp.192–211 [Online]. doi:10.1108/09590550810859150 [Accessed: 25 February 2020].

Lakkakula, P. (2018). 'Potential Impact of Sweetener Input Tax on Public Health'. Applied Health Economics and Health Policy; Auckland, 16 (6), pp.749–751 [Online]. doi:http://dx.doi.org/10.1007/s40258-018-0428-0 [Accessed: 3 December 2019].

Larson, D. and Borrell, B. (2001). Sugar Policy and Reform, Policy Research Working Papers. The World Bank [Online]. doi:10.1596/1813-9450-2602 [Accessed: 21 January 2020].

Larson, D. and Borrell, B. (2001). Sugar Policy and Reform, Policy Research Working Papers. The World Bank [Online]. doi:10.1596/1813-9450-2602 [Accessed: 21 January 2020].
Lichtenstein, D. R., Ridgway, N. M. and Netemeyer, R. G. (1993). 'Price Perceptions and Consumer Shopping Behavior: A Field Study'. Journal of Marketing Research, 30 (2), pp.234 [Online]. doi:10.2307/3172830 [Accessed: 1 April 2020].

Lundeen, E. A. (2018). 'Daily Intake of Sugar-Sweetened Beverages Among US Adults in 9 States, by State and Sociodemographic and Behavioral Characteristics, 2016'. Preventing Chronic Disease, 15 [Online]. doi:10.5888/pcd15.180335 [Accessed: 7 March 2020].

Malik, V. S., Li, Y., Pan, A., De Koning, L., Schernhammer, E., Willett, W. C. and Hu, F. B. (2019). 'Long-Term Consumption of Sugar-Sweetened and Artificially Sweetened Beverages and Risk of Mortality in US Adults'. Circulation, 139 (18), pp.2113–2125 [Online]. doi:10.1161/CIRCULATIONAHA.118.037401 [Accessed: 15 March 2020].

Malik, V. S., Popkin, B. M., Bray, G. A., Despres, J.-P., Willett, W. C. and Hu, F. B. (2010). 'Sugar-Sweetened Beverages and Risk of Metabolic Syndrome and Type 2 Diabetes: A meta-analysis'. Diabetes Care, 33 (11), pp.2477–2483 [Online]. doi:10.2337/dc10-1079 [Accessed: 10 February 2020].

Malik, V. S., Schulze, M. B. and Hu, F. B. (2006). 'Intake of sugar-sweetened beverages and weight gain: a systematic review'. The American Journal of Clinical Nutrition, 84 (2), pp.274–288 [Online]. doi:10.1093/ajcn/84.2.274 [Accessed: 10 February 2020].

Mbaye, A. A., Golub, S. S. and English, P. (2015). Policies, Prices, and Poverty: The Sugar, Vegetable Oil, and Flour Industries in Senegal, Policy Research Working Papers. The World Bank [Online]. doi:10.1596/1813-9450-7286 [Accessed: 21 January 2020].

McDonald’s. (n.d.). Happy MealTM [Online]. Available at: https://www.mcdonalds.com/fi/fi-fi/menu/happy-meal.html [Accessed: 4 April 2020].

Mitchell, D. and Bank, W. (2004). Sugar Policies Opportunity for Change. World Bank Publications [Online]. doi:10.1596/1813-9450-3222 [Accessed: 21 January 2020].

Nicita, A. (2004). Efficiency and Equity of a Marginal Tax Reform: Income, Quality, and Price Elasticities for Mexico, Policy Research Working Papers. The World Bank [Online]. doi:10.1596/1813-9450-3266 [Accessed: 21 January 2020].

OECD. (2019). Tax Policy Reforms 2019: OECD and Selected Partner Economies, Tax Policy Reforms. OECD [Online]. doi:10.1787/da56c295-en [Accessed: 11 February 2020].

Parkin, M., Powell, M., Matthews, K. G. P. and Fry, D. (2005). Economics: study guide. Harlow [etc.: Pearson/Addison-Wesley

Patton, J. H., Stanford, M. S. and Barratt, E. S. (1995). 'Factor structure of the Barratt impulsiveness scale'. Journal of Clinical Psychology, 51 (6), pp.768–774 [Online]. doi:10.1002/1097-4679(199511)51:6<768::aid-jclp2270510607>3.0.co;2-1.

Piros, C. D. and Pinto, J. E. (eds.). (2013). Economics for investment decision makers: micro, macro, and international economics, CFA institute investment series. Hoboken, N.J: Wiley

Poelman, M., Kroeze, W., Waterlander, W., de Boer, M. and Steenhuis, I. (2017). 'Food taxes and calories purchased in the virtual supermarket: a preliminary study'. British Food Journal; Bradford, 119 (12), pp.2559–2570 [Online]. doi:http://dx.doi.org/10.1108/BFJ-08-2016-0386 [Accessed: 3 December 2019].

Salkind, N. (ed.). (2010). 'Repeated Measures Design'. In: Encyclopedia of Research Design, 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc. [Online]. doi:10.4135/9781412961288.n378 [Accessed: 1 April 2020].

Saxena, A., Koon, A. D., Lagrada-Rombaua, L., Angeles-Agdeppa, I., Johns, B. and Capanzana, M. (2019). 'Modelling the impact of a tax on sweetened beverages in the Philippines: an extended cost–effectiveness analysis'. World Health Organization. Bulletin of the World Health Organization; Geneva, 97 (2), pp.97–107 [Online]. doi:http://dx.doi.org/10.2471/BLT.18.219980 [Accessed: 3 December 2019].

Soares, A. A. (2016). 'Putting taxes into the diet equation'. World Health Organization. Bulletin of the World Health Organization; Geneva, 94 (4), pp.239–240 [Online]. doi:http://dx.doi.org/10.2471/BLT.16.020416 [Accessed: 3 December 2019].

Ström Melvinger, K. (2007). 'Ica och Coop är jättarna på marknaden'. Sydsvenskan, 16 September [Online]. Available at: https://www.sydsvenskan.se/2007-09-15/ica-och-coop-ar-jattarna-pa-marknaden [Accessed: 7 March 2020].

Thai Medical news. (2019). Research Links Sweet Drinks With Cancer [Online]. Available at: https://www.thailandmedical.news/news/research-links-sweet-drinks-with-cancer [Accessed: 11 March 2020].

Thow, A. M., Downs, S. M., Mayes, C., Trevena, H., Waqanivalu, T. and Cawley, J. (2018). 'Fiscal policy to improve diets and prevent noncommunicable diseases: from recommendations to action'. World Health Organization. Bulletin of the World Health Organization; Geneva, 96 (3), pp.201–210 [Online]. doi:http://dx.doi.org/10.2471/BLT.17.195982 [Accessed: 3 December 2019].

Tremmel, M., Gerdtham, U.-G., Nilsson, P. and Saha, S. (2017). 'Economic Burden of Obesity: A Systematic Literature Review'. International Journal of Environmental Research and Public Health, 14 (4), pp.435 [Online]. doi:10.3390/ijerph14040435 [Accessed: 10 February 2020].

Welch, P. J. and Welch, G. F. (2013). Economics: theory & practice. Tenth Edition. Hoboken, NJ: Wiley

# 7. APPENDIX

## 7.1 Recommended questionnaire for proposed study

### Supermarket S

Dear Tulika, to better understand how taxation would affect people from different backgrounds, lifestyles and income levels, please help us fill in the following information. No personally identifiable information will be published.

*Did you read the notification about the tax condition you received in the virtual supermarket?*

- Yes
- No

*Which tax condition did you receive?*

- Sugar tax
- SSB tax

*How well do the products that you selected in the web shop reflect your actual purchases in supermarkets?*

- Agree Strongly
- Agree Moderately
- Agree Slightly
- Disagree Slightly
- Disagree Moderately
- Disagree Strongly

*What is your monthly income level?*

- 0-20 000 SEK
- 20 001 – 40 000 SEK
- 40 001 – 60 000 SEK
- 60 001 – 80 000 SEK
- More than 80 000 SEK
- Prefer not to say

*What is the highest degree or level of school you have completed? (If you're currently enrolled in school, please indicate the highest degree you have received.)*

- Some High School
- High School
- Bachelor's Degree
- Master's Degree
- Ph.D. or higher
- Trade School
- Prefer not to say

*How often do you consume alcohol?*

- Never
- Sometimes, <4 times a week
- Frequently, >= 4 times a week

*How often do you smoke?*

- Daily
- Occasionally, <4 times a week
- Never

*Which BMI class do you belong to?*

- Underweight
- Healthy weight
- Overweight
- Obese

*How often do you perform light exercise (equivalent to brisk walk 30 minutes)?*

- Never
- Sometimes, <4 times a week
- Frequently, >= 4 times a week

*How often do you consume the following foods in a day? Please mark by clicking on the box that you agree with.*

| | None | Once/day | More than once/day |
|---|---|---|---|
| **Fruits** | | | |
| **Vegetables** | | | |
| **Processed meat** | | | |
| **Sugary products (baked goods, foods with added sugar such as sweetened yoghurts, chocolates, candy)** | | | |
| **Sugar sweetened beverages (sodas, flavored water, energy drinks or fruit juices with added sugar)** | | | |

*You will now two questionnaires relating to personality and personal preferences. The first questionnaire is regarding Price Perception **(Lichtenstein et al., 1993)**. Please click on the dot next to the statements you agree with. To remove your mark next to a statement, click again.*

**Value consciousness**

- I am very concerned about low prices, but I am equally concerned about product quality.
- When grocery shopping, I compare the prices of different brands to be sure I get the best value for the money
- When purchasing a product, I always try to maximize the quality I get for the money I spend
- When I buy products, I like to be sure that I am getting my money's worth
- When I shop, I usually compare the "price per ounce" information for brands I normally buy.
- I always check prices at the grocery store to be sure I get the best value for the money I spend.

**Price consciousness:**

- I am not willing to go to extra effort to find lower prices
- I will grocery shop at more than one store to take advantage of low prices
- The money saved by finding low prices is usually not worth the time and effort.
- I would never shop at more than one store to find low prices.
- The time it takes to find low prices is usually not worth the effort.

**Coupon proneness:**

- Redeeming coupons makes me feel good
- I enjoy clipping coupons out of the newspapers
- When I use coupons, I feel that I am getting a good deal
- I enjoy using coupons, regardless of the amount I save by doing so
- Beyond the money I save, redeeming coupons gives me a sense of joy

**Sale proneness**

- If a product is on sale, that can be a reason for me to buy it
- When I buy a brand that's on sale, I feel that I am getting a good deal
- I have favorite brands, but most of the time I buy the brand that's on sale.
- One should try to buy the brand that's on sale
- I am more likely to buy brands that are on sale.
- Compared to most people, I am more likely to buy brands that are on special.

**Price mavenism**

- People ask me for information about prices for different types of products.
- I am considered somewhat of an expert when it comes to knowing the prices of products
- For many kinds of products, I would be better able than most people to tell somewhere where to shop to get the best buy
- I like helping people by providing them with price information about many types of products
- My friends think of me as a good source of price information.
- I enjoy telling people how much they might expect to pay for different kinds of products

**The positive role of Price**

**Price-quality schema**

- Generally speaking, the higher the price of a product, the higher the quality
- The old saying "you get what you pay for" is generally true

- The price of a product is a good indicator of its quality
- You always have to pay a bit more for the best

**Prestige sensitivity**

- People notice when you buy the most expensive brand of a product
- Buying a high-price brand makes me feel good about myself
- Buying the most expensive brand of a product makes me feel classy.
- I enjoy the prestige of buying a high priced version of a product.
- Your friends will think you are cheap if you consistently buy the lowest priced version of a product.
- I have purchased the most expensive brand of a product just because I knew other people would notice
- I think others make judgements about me by the kinds of products and brands I buy
- Even for a relatively inexpensive product, I think that buying a costly brand is impressive.

*For the next questionnaire (Patton et al., 1995), click in the box that that best represents your feeling regarding the statements. This is a questionnaire to measure some of the ways you act and think. Do not spend too much time of any statement. Answer quickly and honestly.*

| | ① Rarely/Never | ② Occasionally | ③ Often | ④ Almost Always/Always |
|---|---|---|---|---|
| I plan tasks carefully | | | | |
| I do things without thinking | | | | |
| I make-up my mind quickly | | | | |
| I am happy-go-lucky | | | | |
| I don't "pay attention" | | | | |

| | | | | |
|---|---|---|---|---|
| I have “racing” thoughts | | | | |
| I plan trips well ahead of time | | | | |
| I am self controlled | | | | |
| I concentrate easily | | | | |
| I save regularly | | | | |
| I “squirm” at plays or lectures. | | | | |
| I am a careful thinker. | | | | |
| I plan for job security. | | | | |
| I say things without thinking. | | | | |
| I like to think about complex problems. | | | | |
| I change jobs. | | | | |
| I act “on impulse”. | | | | |
| I get easily bored when solving thought problems | | | | |

| | | | | |
|---|---|---|---|---|
| I act on the spur of the moment. | | | | |
| I am a steady thinker. | | | | |
| I change residences | | | | |
| I buy things on impulse | | | | |
| I can only think about one thing at a time | | | | |
| I change hobbies | | | | |
| I spend or charge more than I earn | | | | |
| I often have extraneous thoughts when thinking | | | | |
| I am more interested in the present than the future. | | | | |
| I am restless at the theatre or lectures. | | | | |
| I like puzzles. | | | | |
| I am future oriented. | | | | |
| I plan tasks carefully | | | | |

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